SYMBIOSIS

EXPLORATION ON THE POSSIBILITIES OF
SOUND-LED COSTUME DESIGN PRACTICE

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Exploration on the possibilities of sound-led costume design practice

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Master of Arts thesis abstract

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Abstract

This Master's thesis explored the possibilities of combining sound design as part of costume design process. The research focused on investigating how sound-led costume design can provide new ways to approach costume design process and how combining sound to costume affects the performativity, interactivity, and presence of the costume.

The thesis consists of an artistic production component as well as a written component. The production component titled *Symbiosis* is a work designed to be experienced in an installation setting and as a short film. The production is a collaboration between me and a sound designer Juha Perä from Aalto University Master's Programme in Art and Media with the Major in Sound in New Media. The goal of the research was to produce knowledge on a topic which lacks extensive research from costume designer's perspective.

In addition to the case study, additional knowledge and wider research scope on the topic was gathered through literature reviews focusing on research and writings on the topic of combining sound and costume as well as analysis of relevant artistic works. Displaying different examples from a variety of artistic fields highlights the large range of possibilities approaching this topic can offer.

The main portion of the thesis consist of the detailed description and analysis of the case study *Symbiosis*. The different stages in sound design create the narrative of the installation and guide the participant through the interactions embedded in the costume. This process created an approach to costume as a multisensory experience with visual, haptic, and aural presence. The spatiality of the sound affected the spatiality of the costume, creating space inside the costume as well as expanding the spatiality of the costume to the surrounding space through interactive spatial sound design. We chose to use wearable electronics for integrating the sound to the costume. This created an interactive aspect to the installation. As a result, in *Symbiosis* costume is approached as an interactive co-performer and companion. The sound design in the installation can be experienced through the physical interaction with the costume. The integration of sound and interactivity to the costume created a post humanistic way of approaching the costume. Subsequently, the costume was approached from a costume centric instead of a human centric perspective. In the fictional world of the installation the human participant is invited to experience the world through the point of view of the costume.

Keywords costume design, wearable electronics, interactivity, sound design, sound-led, costume

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Tämä maisterivaiheen opinnäyte tutki mahdollisuuksia, joita äänisuunnittelun yhdistäminen pukusuunnittelu prosessiin voi tuottaa. Tutkimus keskittyi tarkastelemaan sitä miten äänilähtöinen pukusuunnittelu voi luoda uudenlaisia tapoja lähestyä pukusuunnitteluprosessia, sekä sitä miten äänen yhdistäminen pukuun vaikuttaa puvun esityksellisuuteen, kokemuksellisuuteen ja olemukseen.

Opinnäyte koostuu kirjallisesta ja taiteellisesta osuudesta. Taiteellinen osuus *Symbioosi* on työ, joka on suunniteltu koettavaksi installaatioteoksena sekä lyhytelokuvana. Symbioosi toteutettiin yhteistyössä äänisuunnittelija Juha Perän kanssa, joka opiskelee Aalto-yliopiston Taiteen ja median laitoksen Sound in New Media -pääaineessa. Työn tavoitteena oli tuottaa uutta tietoa aiheesta, jota pukusuunnittelijan näkökulmasta on tutkittu varsin rajallisesti.

Taiteellisen produktion lisäksi aihealueen tutkimusta laajennettiin käyttämällä äänen ja puvun yhdistämistä käsittelevää lähdekirjallisuutta, sekä analysoimalla muiden taiteilijoiden aiheeseen liittyviä teoksia. Erilaisten teosten esittely eri taiteen osa-alueilta osoittaa sen, kuinka monia eri lähestymistapoja pukusuunnittelijoille aihealueen käsittely voi tuottaa.

Produktio-osuuden analyysi muodostaa opinnäytteen laajimman osuuden. Installaatioon suunniteltu äänimaailma ja sen eri vaiheet ohjaavat installaation kokijan vuorovaikutusta puvun kanssa. Äänilähtöinen suunnittelu tuotti lähestymistavan, jossa puku koetaan moniaistillisena kokemuksena, johon liittyy visuaalinen, fyysinen ja äänellinen vuorovaikutus. Äänen tilallisuus vaikutti puvun tilallisuuteen tavalla, jolla puvun sisälle syntyneen äänellisen tilan lisäksi puvun tilallisuus laajentui ympäröivään tilaan interaktiivisen tilaäänisuunnittelun kautta. Teoksessa ääni yhdistettiin pukuun käyttämällä puettavaa elektroniikkaa. Puettavan elektroniikan käyttäminen äänen tuottamisen välineenä, tuotti teokseen interaktiivisen ulottuvuuden. Tämä seurauksena *Symbioosi* teoksessa pukua lähestytään interaktiivisena kanssakokijana ja kanssaesiintyjänä. Installaation äänimaailma on koettavissa puvun kanssa käytävän fyysisen vuorovaikutuksen kautta. Äänen ja interaktiivisen teknologian yhdistäminen pukuun tuotti teokseen posthumanistisen lähestymistavan, jonka kautta puvun ja ihmisen hierarkiaa tarkastellaan ihmiskeskeisyyden sijaan pukukeskeisestä näkökulmasta. Teoksen maailmassa puku on itsenäinen olento, jonka kokemukselliseen maailmaan ihminen kutsutaan hetkellisesti.

Avainsanat pukusuunnittelu, puettava elektroniikka, äänisuunnittelu, äänilähtöisyys, interaktiivisuus, puku

CONTENTS

1. Introduction

What has always fascinated me about art is its ability to make us see and experience the world in new ways. If art is an extension of its creator, then through experiencing other artists work we are offered a gateway to the world through their eyes. This shift in perspective can make us see things in a new light. For me one of the most compelling attributes of art is this discovery, finding a new narrative or relating to one like my own. I would like to take this notion a step further and propose a way of thinking where the work of art can be seen not only as a mirror of its creator but also as an entity with individual identity. What if we viewed life through the 'eyes' of a costume, what would we see? If we could hear the costume speak, what would it say?

Costume design for me is in many ways about telling stories. Like the camera is for the cinematographer, a costume for me has been a tool to visualise a given narrative, world, and characters.

However, my experiences on costume design were broadened when I took part in Aalto University's course *Costume as a Performance*. During this course I worked with two dancers as a costume designer and a choreographer. Instead of starting the work from a given narrative or characters these were discovered through observation and experimentation in movement-based costume-led process.

During that course the costumes I had chosen for us to work with became like co-performers to us, and they started to form a narrative that grew from their own way of moving and making shape. By listening to the material and its physical qualities we started to see how the costumes themselves liked to move and shape around the body.

During the course we also studied how different sounds played from the speakers in the space affected the way the costumes expressed themselves. We chose to play recorded ice sounds as part of a demo performance we prepared for the course. The use of sound in the performance created a whole new narrative level and spatiality to the costumes.

As a result, I decided to continue working with these topics in my Master's thesis by creating a project that would integrate the immersive experience and feeling of discovery that I love about art to the perspective of costume as a co-performer in a sound-led design process. I started wondering what possibilities could be discovered if sound was integrated into the costume on a more tactile and physical level to create an interactive experience intertwining sound and costume together.

1.1 Thesis topic

This Master's thesis consists of an artistic production component as well as a written component. The production component titled *Symbiosis* is designed to be experienced in an installation setting and as a short film. *Symbiosis* explores the possibilities of combining sound into costume and costume design process with the use of wearable electronics. The production is a collaboration between me and a sound designer Juha Perä from Aalto University Master's Programme in Art and Media with the Major in Sound in New Media and was executed in collaboration with Aalto Fablab manager Krisjanis Rijnieks.

This Master's thesis explores the possibilities of combining sound design as part of costume design process and the integration of sound to the costume with the use of wearable electronics. Since the act of creating and discovering through the process of making art is at the center of this research according to Professor (em.) of Research in the Arts Henk Borgdorff's definition it feels valid to use the term artistic research in the context of this thesis. Borgdorff states that

> We can justifiably speak of artistic research ('research in the arts') when that artistic practice is not only the result of the research, but also its methodological vehicle, when the research unfolds *in and through* the acts of creating and performing (Borgdorff 2010, 46).

In the case of my thesis the artistic component *Symbiosis* is the foundation through which I approach and study the research questions I have set for this thesis. In accordance with Borgdorff's statement the core part of the research has been done through the act of creating *Symbiosis*. My research methodology therefore has been experimental and practical, utilising practise based and discovery-led processes. However, to broaden my own thinking and to connect my work to the wider research field of costume design, external material such as research and other bibliographical sources on the topic have been used as an important point of reference.

The process of creating *Symbiosis* resulted in two adaptations of the concept, an installation and a short film. However, the installation piece remains as the center piece and main focus of study throughout this thesis. The film, even though an important part of the project, was not the end goal rather an interesting additional result of the process. Therefore, it could be more accurate to state that there is one body of work that can be experienced in these two different mediums with the installation remaining as the main medium. However, even though the content of the piece remains the same in both mediums, they offer a different experience of the work. Therefore, I consider it appropriate to talk about these as two separate adaptations of the same concept rather than the film being a mere documentation of the work which was its original purpose. The focus for the process of filming the short film was to document the work but also to take time to study and test the installation concept in a studio environment before putting it on display. That time in the studio was important in investigating what the interaction with the costume feels like, as well as to work with the sound material and sound design for the space.

Even though the case study includes a short film as another art form in addition to the installation, the focus of this thesis remains mainly in the field of performing arts. Therefore, costume and sound design processes for film and television fall outside the scope of this thesis but remain as an additional point of reference and comparison for the discussion.

Because wearable electronics play an integral part in the sound design and costume design processes of *Symbiosis*, background and technical details on the topic will be discussed. However, as the technical side of the work, such as designing the hardware and its functions, was part of Juha's responsibilities based on our mutual discussion of our personal interest and how we chose to divide the work, these processes will not be covered in great technical detail. The main concepts and practical functions of the electronics that are relevant to understanding the costume design process and the function of the work will be explained to the extent of what is relevant in the scope of this thesis. The focus remains in the creative process and practical functionalities. As *Symbiosis* is also the artistic part of Juha's Master's thesis the sound creating process and the more technical side of the use of wearable electronics will be elaborated in his work.

The research is therefore approached with the following as the main research question,

Can sound-led design process open interesting new ways to approach and experience costume from costume designer's perspective?

To broaden the topic, I have created two sub-questions as follows.

Can sound be used as part of the costume to expand costume's performative and narrative qualities and if so in what way does the presence of sound change the way the costume is perceived?

How does implementation of sound as the leading element of the costume design process affect how the process is approached and how it is conducted?

In addition to the case study, additional knowledge and wider research scope was gained through literature reviews focusing on research and writings that already exist on the topic as well as by analyzing artistic works that combine sound and costume in innovative ways. The collaboration between a costume designer and a sound designer and the combination of sound and costume as a starting point for artistic projects is a fairly unresearched topic especially from costume designer's perspective. Therefore, bringing together existing works and my personal practice-based research on the topic seems relevant to the development of my field.

Therefore, the goal of this research is to offer new practical and theoretical knowledge on the topic for me professionally as well as for the artistic community in the field of costume design at large.

Sound traditionally has a more practical rather than artistic role in the costume design process which could be one reason why the artistic and creative possibilities of this collaboration are not more widely explored. For example, based on my personal experience in traditional film production costume designer and sound designer work together mainly on set to find the best placement for the microphones on the actor's body or the costume. The sounds created by the costumes, such as the rustling of the fabric, are seen as more of a defect rather than an artistic tool, since they disturb the recording of the actor's dialogue. Often these sounds are recorded separately as foley sounds and added in the post-production.

Costume designer Tjaša Frumen describes similar thoughts on the topic in her Master's thesis stating that sound has the potential to make the experience of a performance more immersive for the audience as well as the performers, but is rarely used in direct connection with the costume other than on a practical level of figuring out the placement of microphones (Frumen 2019, 14).

Theatre scholar Stephen Di Benedetto argues that sound can be used in the context of a theatre performance to arouse feelings and emotions. He emphasizes how all our sensory experiences are connected to each other. For example, a sound can trigger a memory attached to a certain place that then brings out other sensory sensations connected to that place, for instance how we physically felt in that situation (Di Benedetto 2010, 125, 146).

Sound, like costume, can create strong bodily impulses and sensations. These could be enhanced by making the costume itself the source of the sound instead of just something you look at while you listen to sounds coming from the surrounding environment. This research explores this bodily aspect of sound further to see if through combining wearable electronics and sound design to costume it is possible to find new ways to experience costume and sound as a visual, audible, and physical experience.

1.2 Structure of the thesis

This thesis starts with the literary review and exploration of already existing examples of artistic works exploring the topics of combining sound and costume as well as the concept of costume as a co-performer. The focus of the following chapter *Theoretical frame – costume, sound, and interaction* is to attach my own case study to the broader field of costume design and give background on the chosen topic. Many of the works referenced have served as inspiration for project *Symbiosis* and offered valuable insight on the topic of this thesis. Because the way sound and costume are approached in the case study *Symbiosis* is only one possibility among many, it is important to display other examples to highlight the large variety of possibilities approaching this topic can offer.

Following chapter *Methodology and methods* lays the groundwork for the case study by discussing the methodology and methods by which it was approached. The chapter also contextualizes the work in connection with the autoethnographic research methods and the framework of posthumanism which were important in the way the research was approached and conducted.

The remaining portion of the thesis consist of the detailed description and analysis of the case study *Symbiosis* as well as the conclusion statements of the work. The case study is the main portion of this thesis since as stated earlier the research has been conducted in and through the artistic practice.

2. Theoretical frame – costume, sound, and interaction

This chapter focuses on the cultural and historical background of sound as part of costume and explores the idea of costume as a co-performer through artistic and theoretical analysis.

The works I have chosen as examples come from different fields, but all of them include costumes that possess a performative function. Because, the clothes and costumes used in the fields of fashion, fine arts and regional dress can possess narrative and performative qualities I decided to include appropriate examples from these fields as well as more traditional examples of costumes from the field of performing arts and especially contemporary dance.

This is an overview of the existing practises and experiments in the use of sound as an integral part of costume and dress. The examples that are provided here have played an important role in my research as I have discovered the possibilities of sound as part of costumes and costume design processes. This is not however a conclusive history on the topic but rather a more concise examination narrowed down to fit the scope of this thesis.

2.1 The historical and cultural connection of sound and costume

The use of sound as part of costume has a long history. The use of sound as an essential element in costume can be found for example in carnival costumes, folk dress, and shamans' dress. One of the most common manifestations of sound in costume is the use of brass bells. According to Luc Rombouts, a Belgian carillonneur, brass bells have long played a significant role as part of everyday lives and dress. He states that bells have a practical function as locating devices, but more importantly they are strongly connected to spiritual life and traditions. The repetitive sound of brass bells is used to ward off evil spirits both in natural world and afterlife. In Egypt bells were believed to contain a person's soul and therefore placed into the grave with the body. Brass bells have also been found in Roman and Greek graves as amulets to protect and guide the dead in afterlife (Rombouts 2014, 23). According to cultural anthropologist Lynne Hume, a shaman often includes bells and other metal ornament in their costume 'so that he is impressive not only to look at but also to hear' (Hume 2013).

Photographer Charles Fréger has travelled the world photographing regional folk costumes used in carnival traditions. According to him many of these costumes carry brass bells. For example, in Ortueri, located in the province of Nuoro in Sardinia Italy, a carnival character called Sonaggiao is named after its costume which includes twenty kilos worth of bells in various styles and sizes. In Greece during the carnival, the masked characters called Arapides travel from house to house driving out evil spirits with the sound of the bells attached to their costumes (Fréger 2012, 261,264).

An interesting modern example on the use of bells in clothing is the fashion designers' Viktor & Rolf 2000 autumn winter couture collection titled *Bells*. Even though their work is labelled as fashion I have chosen it as an example because it possesses strong performative and narrative qualities. In the case of *Bells* the runway show can be viewed as a display of garments but also as a performance. On the Viktor and Rolf webpage the collection is described as 'multi sensory experience' (viktor & Rolf, n.d.). In this case the bells were part of creating not just visually pleasing garments but a performative multisensory experience where the costumes manifest through sound and visuals.

According to a description on the Viktor and Rolf webpage

> Garments were heavily embroidered with brass bells that, when worn, created a shimmering, sonorous effect of great elegance and mystery. The show was carefully choreographed to ensure that the eagerly waiting audience heard the garments before they emerged from shrouds of fog, visible for a brief moment before passing again into the mist. For Viktor&Rolf, the show was about creating an aura, grasping the intangible (Viktor & Rolf n.d.).

As can be witnessed from the video recording of the show which is available on the webpage, the sound of the bells can be heard long before the model appears to the audiences view, creating a sense of suspense and mysticism. This also allows the viewers imagination to start writing the narrative for the costumes with the sound as the leading element.

What I find interesting in the case of *Bells* is the intention to grasp the intangible. This interplay between the physicality of the costume and the abstractness of sound creates a fascinating combination. Musician Svetlana Maras writes in her Master's thesis about the use of non-musical objects as instruments. She contemplates on this poetic juxtaposition of the abstractness of music in contrast with the corporeality of physical objects and states that giving sound a physical form is a way of trying to comprehend its abstractness by bringing it back from the immaterial form to the material world where it originates (Maras 2011, 12).

This interplay is beautifully made use of in the case of *Bells* where the sound starts as an intangible force filling the space and is then brought back to its material form when the model emerges from the smoke.

The sound of bells connects the clothing to the historical and cultural connotations associated with bells. This becomes the leading narrative element in the show because the audience is allowed to start the narrative associations with the sound of bells before the costumes become visible. This narrative is then combined with a new layer of meaning from seeing the costume as the model emerges from the fog.

This way sound creates a bridge between the visual tactile world and the world of the invisible through our imagination. The use of the sound of bells therefore creates another layer of meaning to the garment, becoming part of its narrative. Costume in this way becomes a multi-sensory experience with both physical and aural presence.

2.2 Creating sound through material in movement

Artist Nick Cave's *Soundsuit* is similar in appearance and presence to the costumes explored in Charles Fréger's photography both visually and in the way they are used. *Soundsuits* like for example the costume of Arapides have a creature-like form that conceals the wearers' identity. Also, both are worn in public space in a ritualistic manner creating sound through the movement of the wearer.

As described in the Moma webpage by Nick Cave the first *Soundsuit* served as a way for him to comment on the 1992 Rodney King incident and a way to process the feelings of being disvalued and disregarded as a black man that resulted from it (Cave, n.d.).

According to Cave the first *Soundsuit* was created from twigs he found in the park. He collected these discarded objects and gave the found materials a new life and meaning through art (Cave, n.d.). Cave describes the experience of the first time he put the suit on

> The moment I put it on and started to move, it made sound, and so that's how Soundsuit came about. And sound at that moment was my call for protest. It was a way of being heard (Cave, n.d.).

In this case sound was not just an acoustic element in the costume, but it had a narrative significance and a personal meaning for the designer.

Costume designer Pirjo Valinen's work *Susurro* is another example of a costume design where the sound of the costume originates from the materials and is activated through the movement of the performer. As written on the performance webpage by Pirjo Ylimaunula, the performer of the work, *Susurro* is a performance where the costume creates a soundscape. The costume in *Susurro* is made of paper and in the hands of the performer turns into an instrument-costume creating sound through motion. In this performance the costume becomes an instrument, and the dancer becomes a musician and a composer. The material of the costume speaks through the performer and together they create a performance where the performer's body, costume and sound are linked together (Ylimaunula 2012). In the case of *Susurro* sound as the leading element of the design process affected the shape, materials, and movement of the costume.

Similarly, Jessica Bugg's project *Drawing with the Body and Cloth* explores the connection of body and costume in motion. Through this project Bugg created a costume and performance titled *The Tempest Dress*. This costume and performance is an interesting example in the use of sound as part of costume. The National Gallery painting *A Detail from The Tempest* by Peder Balke worked as a starting point and inspiration for the costume design and performance (Bugg 2015, 1). According to Bugg *The Tempest Dress* is not just a visual interpretation of a tempest, instead it aims to create a bodily experience of the storm through sound, emotion and movement of the costume and performer (Bugg 2015, 17).

In a way she brought the painting to life, giving the storm depicted in it a physical, embodied, and aural presence through the movement of the costume and the performer. Sound therefore becomes a narrative element, creating meaning to the costume.

Bugg describes how in the creation process the sound became an important element in shaping the costume. The performer was able to create sound with the costume through her movement and by changing the shape of the dress this sound could be manipulated (Bugg 2015, 17). Sound therefore affected the shape of the dress and the movement of the performer, becoming part of choreography and costume design process.

Sound created by a costume can in this way become a guiding element in creating choreography and the costume design process by suggesting ways the costume could be moved, shaped, and constructed. When costume and sound become intertwined through movement, like in the case of *Susurro* and *The Tempest Dress*, the role of the costume and the performer expands. Costume exists simultaneously as a costume and an instrument as the performer works both as a dancer and musician, composing sound and movement through costume.

Personally, I find it interesting to think that costume does not come to the end of its development when the performer puts it on, but instead that becomes the moment when the costume comes to life and starts to evolve.

2.3 Costume, sound, and wearable electronics

Maria Echeverri, a fashion historian, and researcher writes about how costume and body are connected through sound. She argues that 'dress allows the body's natural sonorous state to be manipulated, suppressed or amplified' (Echeverri 2013, 1).

If we look at costume and body as a unity, then the sounds originating from the body become part of the costume itself. This is the case in costume designer Liisa Pesonen's work *Immediate Invisible*, a fashion collection, consisting of garments that amplify the sounds originating from the wearers body. Similarly, to the works by Viktor & Rolf, the designs of Liisa Pesonen, even though fashion garments, are performative and could even be viewed as performances in themselves. Liisa Pesonen explains the technology used in the garments in a following way.

> The idea included biofeedback sensors, processors and audio systems built inside of individual garments. Biofeedback sensors are able to harvest data such as heart rate and oxygen saturation. The sensors enable the harnessing of physiological input to give modified soundscapes as an output, thus exposing the active functions that exist beneath the skin (Pesonen 2013, 11).

In this case the sound of the garment and the sound of the body are connected. It is difficult to separate where the body ends, and the garment begins. Garments in the *Immediate Invisible* collection work like hearing devices for the body, something that can be seen more as an extension of the body of the wearer rather than a separate addition to it.

Michele Danjoux states that costume and body can become inseparable a type of 'instrument-body' or 'body-instrument' where the body and costume are intertwined so that they only exist in their intended form when connected (Danjoux 2014, 206).

The garments of the *Immediate Invisible* collection entwine the body of the wearer and the garment together with sound. The body and garment give meaning to each other and exists in their intended form only when, connected through sound and touch. Therefore, the term 'body-instrument' as used by Danjoux could be applied to the garments in *Immediate Invisible*.

Di Mainstone is an artist who creates wearable sound sculptures or sonic devices, which are often activated through wearing and especially through the movement of the wearers body. Her approach relates perhaps primarily to the point of view of sculptor and composer, but due to the wearable and body conscious nature of the designs many of them could be considered as costumes.

Human Harp is a work by Di Mainstone which has expanded to an international collaboration. *Human Harp* is a wearable instrument that connects the wearer to a suspension bridge, allowing them to create sound through their movement by releasing the frequencies of the bridge's suspension cables (Di Mainstone n.d.). The wearer of *Human Harp* becomes a performer, musician, composer, and instrument. The wearable instrument could be viewed as an instrument-costume, but also as part of the space. From a costume designer standpoint this work, like the work of Liisa Pesonen, blurs the lines of what costume can be, it exists simultaneously as a 'wearable', an instrument, part of the space and part of the body.

Wearable electronics give the possibility to connect the sound of the costume to the body of the performer and the surrounding space. In a way, the use of wearable electronics can expand the reach of the costume further away from the body like in the case of *Human Harp* or inside the body like in the case of *Immediate Invisible*.

When we define costume as an extension of the body I would argue that the term costume can be considered to include prosthetics and other wearables that break the traditional form of costume as garment. Artist Kate Reed has created a work titled *Musical prosthetics* which consist of musical instrument-sculptures that attach to the human body. Even though her works are not labelled as costumes they could be categorized as costumes according to this definition.

According to Reed

> Musical prosthetics are a new form of interactive media and tool for enhancing non-verbal communication (Reed 2021).

Reed explains that the sensors attached to the prosthetics read data created by the movement of the body. That data is then sent to a microcontroller where it is transferred to sound and music in real time (Reed 2021).

What I think is especially intriguing in the case of *Musical prosthetics* is how Reed talks about the prosthetics not just as instruments or wearables but as non-verbal communication devices. As the wearer of the prosthetic is controlling the sound through their movement and body position, they can express themselves both through movement and sound simultaneously. I would argue that the physicality of the sound also affected the way the prosthetics were shaped and designed around the body.

A work titled *The Prosthetic Instrument* by artist and musician Ian Hattwick was created around a similar idea. According to Hattwick *The Prosthetic instrument* is a wearable instrument designed for a dancer to be played with the dancer's whole body in movement. This way the instrument becomes an extension of the dancer's body existing simultaneously as costume, staging, lighting and performer (Hattwick 2016).

Hattwick recognizes the fluidity of the terms used to define artistic work. Costume can be a multifunctional piece with overlapping definitions and functions. Something considered as instrument can for example at the same time be seen as costume, or staging. This overlapping of roles and functions seems to be a recurring theme in projects where sound and costume are connected. The implementation of a new media and tool like sound for artistic expression to the costume expands costumes functions and role in the performance and design process. This overlapping of functions and roles extends to the designers and performers suggesting a collaborative way of working. In addition, it creates an interesting discussion around how we define and label things in our practice as the lines between different roles and terms become blurred and extended.

New media artist Melissa Coleman states in her interview with Rebeccah Pailes-Friedman for the book *Smart Textiles for Designers: Inventing the Future of Fabrics* that

> One of the functions of fine art is to create a discourse around subjects that are already happening in society, or that are looking to start happening. And anything related to textiles is never separated far from issues around the body. When you start combining textiles and electronics it touches on issues around privacy, intimacy, expression, and different forms of display (Pailes-Friedman 2016, 13).

What I find interesting in the use of wearable electronics and sound in costume design are these topics around intimacy and bodily experiences mentioned by Coleman. Even though costume can be made of many other things than just textile anything related to costume is always somehow connected to the issues around the body.

On a similar line Birringer and Danjoux write about the use of wearable electronics as part of costume in a sound-based choreographic installation *UKIYO*. According to them when sound is connected to costume through wearable electronics the costume becomes a medium and wearing becomes a performance technique that connects the digital technology with the physical body (Birringer, Danjoux 2013, 233).

When sound becomes physically connected to the body through costume it is possible to expand the costumes performative and spatial properties. In this way sound can become a tool for personal expression as well as a narrative element of the dramaturgy. This interplay between the immateriality of the sound and physicality of the body creates an interesting playground for dramaturgical and spatial dimensions. Sound can be very local or on the contrary it can be difficult to detect its origin. By localising sound to the costume, it becomes part of the costume and adds a new sensory and spatial element to it.

2.4 Costume as a co-performer

By using wearable electronics as part of the costume it is possible to add certain autonomy and performativity to it that enforces the role of costume as a co-performer performing with the person interacting with it. This is the case for example in *INCERTITUDES* by artist Ying Gao. *INCERTITUDES* makes use of robotics and interactive technology inserted in the costume making the costume move independently from its wearer. As Opposed to *Musical prosthetics* and *The Prosthetic Instrument* that were activated by the wearers movement here the costume reacts to people in its surrounding. As described by Gao on the webpage of the work, *INCERTITUDES* is a garment made of a material which is covered in metal pins that stick outward from its surface. These pins are set in motion by the sound of the spectator as if the costume was engaging in the conversation with them by reacting to their speech with movement (Gao, n.d.).

In this case the person wearing the costume does not have control to the reactions and movements of the costume. By giving the costume individual action changes the power hierarchy of the action of wearing the costume away from the wearer. This changes the privacy and security of the action of wearing as the private space around the body where the costume is located is inhabited by an entity no longer in our total physical control. In this case rather than a mere addition to our bodily space the costume becomes an active inhabitant of it.

Like living organisms is a costume created by a design studio Local Androids. As the title of the work suggest the costume imitates living organisms with its visual appearance and behavior. Similarly, to *INCERTITUDES* the work *Like living organisms* reacts to its surroundings with movement. The costumes material has a skin-like color and texture making it blend with the body of its wearer. According to the projects webpage the piece is shaped around the body having inflatable shoulder 'balloons' that pulsate as well as hip flaps with protruding and pulsing shapes resembling veins on its surface. As demonstrated in a video recording on the project's webpage of the costume in action, when approached the pulsing intensifies as if the heartbeat of the costume-creature would increase. When the person approaching the costume comes to contact with it the shoulder balloons deflate as if the costume was letting its guard down and showing its vulnerability (Local Androids, n.d.).

What I find relevant about the works discussed in this chapter in relation to my own work *Symbiosis* is the way of treating the costume as an independent entity, performing both with and without a human body. The use of interactive technology in costume this way makes costume an active agent, existing similarly to the performer through sound and movement. The costume can exist as an independent entity momentarily joined with the human body in the live event of tactile interaction.

As a result of the global COVID-19 pandemic, which happened during my Master's degree studies, our social interaction changed drastically. We had to isolate ourselves, limit social interactions and avoid physical contact. This emphasized the importance of physical interaction in our social life and made me think about closeness and distance in relation to costume.

The theme of closeness and distance as well as costume as an independent performer is explored in the work *Touch me not* by Ella Fabritius, Minerva Skyttä and Susanna Raiskio. This work was exhibited in Aalto University as part of the Experimental Textile Design Course Exhibition 2021, displaying selection of fashion students work created in collaboration with the department of Engineering. I had the opportunity to see this piece on display.

The work consists of a piece of fabric with small metal rings interwoven in its texture. The fabric which was displayed on a small pedestal started moving when it was approached. The movement sensor attached to the front of the pedestal triggered a motor placed inside the pedestal. The motor then started to rotate a plate placed right under the piece of fabric. The plate had magnets attached to it and when it started to rotate the metal rings inserted to the fabrics texture reacted to the movement of the magnets below, making

the fabric move along with them. As the mechanics were hidden the only thing visible to the viewer was that the fabric started to move when approached. This give the illusion that the fabric was somehow alive and aware of its surroundings.

According to the team behind the work the inspiration for this piece was a plant called *Mimosa pudica*, which closes its leaves when touched to protect itself (Fabritius, Skyttä, Raiskio 2021). I find this piece extremely fascinating because it investigates how material can have an individual presence and behavior. My personal experience with this piece was a feeling of wonder and excitement when I saw how it reacted to my presence in a way that was unpredictable and not obvious to the eye.

What is also interesting in *Touch me not* is the idea of the material's aversion to the human presence. Instead of willingly welcoming and succumbing to the approaching person, the piece becomes restless and agitated.

Costume designer and Professor of Costume Design for Theatre and Film Sofia Pantouvaki suggests that with new technological material and media in costume it is possible for costume to become an interactive component between the body and the space as well as a transmitter and receiver of emotion (Pantouvaki 2014, 192-193).

Emotions are seen as something that differentiate intelligence from artificial intelligence. Therefore, I find it interesting how the experience of feeling emotions could be mimicked or transmitted with costume using wearable electronics. For example, in the case of *Touch me not* where the feeling of anxiety caused by physical closeness was explored.

The concept of the relationship between a human and an object from a posthumanism standpoint was explored in *Homo Viridis*, an interactive installation piece where a Monstera Deliciosa plant and human interacted through the use of wearable soft robotics. The person experiencing the installation was wearing a pneumatic sleeve that had a wearable soft robotic skin covered in silicone to create an effect of an alien skin texture. The sleeve inflated mimicking organic shapes and movements when the person touched the plant. The inflation of the pneumatic sleeve created pressure on the arm giving the person both visual and haptic feedback created by the interaction (Christiansen, Beloff, Jørgensen, Belling, A-S. 2020).

All of the works discussed in this chapter provide examples on how integrating electronics to the costume can enhance the indivisual performativity of the costume, making it an active agent that can perform through and without the physical contact with the human body. This individuality and unpredictable performativity of the costume was something we also decided to investigate with project *Symbiosis*.

Fig. 1

Picture I took of the work *Touch me not* on display in Aalto University 2021. In the picture you can see the grey pedestal which has the motor structure hidden inside. The distance sensor is placed in front of the pedetal to detect the approaching visitors. On top of the pedestal is the fabric sample with the interwoven metal rings.

3. Methodology and methods

In this chapter I will elaborate on the methodology of this research as well as the main research methods used in the creation of *Symbiosis*.

3.1 Autoethnography as a research method

According to prof. Tony E. Adams, prof. Carolyn Ellis and prof. Stacy Holman Jones

> Autoethnography is a research method that uses personal experience ("auto") to describe and interpret ("graphy") cultural texts, experiences, beliefs, and practices ("ethno") (Adams, Ellis, Jones 2017, 1).

They elaborate that

> Given the focus on personal experience, autoethnographers also describe moments of everyday experience that cannot be captured through more traditional research methods. Doing autoethnographic fieldwork allows what we see, hear, think, and feel to become part of the "field" (Adams, Ellis, Jones 2017, 4).

Capturing these everyday experiences and analysing the information gathered through our own senses is especially relevant in artistic research which focuses on research through the act of making and experiencing art. In the context of artistic research autoethnography as a research method focuses on personal experiences to articulate and bring into the academic discussion the knowledge gained in artistic practise which through other research methods would stay hidden.

According to prof. Heewon Chang engaging the personal experiences to a wider cultural context is an integral part of autoethnographic research because it elevates its self-narrative and storytelling features from mere self-reflection to cultural analysis (Chang 2008, 43).

Therefore, to gain broader understanding of the research topic the personal findings gained through the autoethnographic research process of *Symbiosis* are reflected and interpreted in the context of the research fields of costume design and related practices.

3.2 Outside and inside perspective

Through physical interaction with the costume, it is possible to achieve a wider understanding of the costume's capabilities and properties. *Symbiosis* is an interactive installation designed to be experienced by one person at a time. Because the experience is made for the participant and not an outside audience, as a designer I saw it important to use firsthand experience of interacting with the costume to gain knowledge of the experience itself and to find ways in which the work could be developed.

MASK by costume designer Charlotte Østergaard is an example of self-reflective, artistic process. In *MASK* Østergaard experimented with cutlery as a material for mask making. She worked both from the 'outside' by observing her partner Jeppe Worning making a mask on himself, as well as from the 'inside' by experimenting with making the mask on herself.

As described by Østergaard she did not allow herself to look into a mirror while taping the cutlery on her face and head to visually guide the process. This prevented the aesthetic qualities take a lead in the design process. She wanted to experience the material only through the physical contact. According to Østergaard not being able to see herself through a mirror during the process, gave her more freedom to explore the sensory qualities of the materials she was working with (Østergaard 2018, 66).

I have approached creating costumes mostly from the perspective of the viewer/maker who observes the costume from the outside. However, to further develop my artistic practice and to gain personal experiences of the costume as an installation piece, I combined in the process of *Symbiosis* the 'outside' view with the 'inside' view. This resulted in working with the costume in turns from the outside as a maker and designer and from the inside as the wearer. This was also important in relation to the sound-led design process, because it gave space for the sense of hearing and touch in the design process and in this way prevented the visual aspects of the costume to take a dominating role.

Performance maker and performer Sally E. Dean talks about a somatic approach she calls 'Aware-Wearing' as a similar practice. She states that the most important part of 'Aware-Wearing' is the process of sensing your body, the costume and the environment and being present in the moment with the sensory feelings that emerge by focusing your attention to them (Dean 2020, 232).

Symbiosis is a multi-sensory work focused on the sense of hearing, touch, and vision. Therefore, this type of approach was important, because it promotes gathering and analyzing personal sensory inputs gained in the hands-on work with the costume. For the reason that we were not working with a performer during the process, it was even more essential that the experience of wearing and using the costume was implemented in my own design practice.

Combining the method of working from the inside through personal bodily experience of the costume with looking at the costume from the outside perspective can potentially create a process loop where one feeds the other and leads to a richer outcome. According to Østergaard both perspectives are important and allow us to become 'active observers' of our own work (Østergaard 2018, 61).

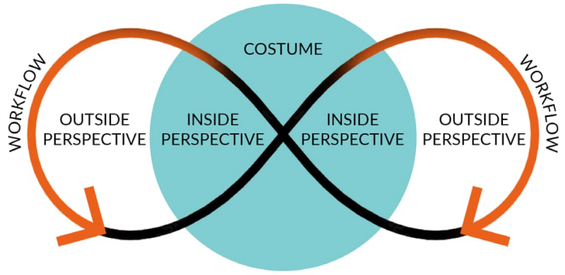


Fig. 2

Model I created to demonstrate the process loop which shifts between the maker's 'outside' perspective and the wearer's/performer's 'inside' perspective. Working with these two methods encourages the design process to take into consideration the physical and sensory aspects of the costume. This way the process is not led by the visuality of the costume, as the visual and physical aspects are being worked on simultaneously.

3.3 The artificial organic – about posthumanism

Even though this thesis is not about the theory of posthumanism it has been a strong theoretical frame for the research and production of *Symbiosis* and therefore I will explain how I understand it in the context of this thesis.

Posthumanism is a movement with varying currents of views. However, as stated by Braidotti and Hlavajova it can be defined as a combination of post-humanism and post-anthropocentrism. Post-humanism ideals criticize the exclusive and constrained view of 'human' in humanism movement. Post-anthropocentrism on the other hand promotes bio-centred egalitarianism (Braidotti, Hlavajova 2018, 1).

According to Francesca Ferrando posthumanism is a philosophy manifesting post-dualistic and post-centralizing approaches (Ferrando 2019, 3). As posthumanism focuses on the deconstruction of human it recognizes the gendered, ethnic, social, and other individual varieties of the term as it re-examines speciesism between human and nonhuman entities (Ferrando 2019, 2).

According to Braidotti and Hlavajova it is important to recognize that the term non-human in residual humanism is used in reference to those outside the anthropocentric view of ruling colonial European powers. Excluding from the term human ethnicities that fall outside that scope as well as other earth species like animals and vegetation. They argue that the interaction and interconnectedness of the defined human and non-human terms is more complex and defies this type of dialectical opposition. (Braidotti, Hlavajova 2018, 2).

Posthumanism therefore is a philosophy that strives to deconstruct the meaning of the term human and examines a view that promotes egalitarianism between all lifeforms. It recognizes the complexity of the term while proposing a more inclusive and intricate definition. In relation to my work, I find this line of thinking introduces new ways to see and interact with costume and our environment from a receiving and co-operative standpoint.

Anneke Smelik a professor for Visual Culture and Fashion Studies defines the term posthuman in a following way

> In the context of fashion, my provisional definition of the posthuman is a hybrid figure who decenters human subjectivity, celebrating in-betweenness, by making alliances with all kinds of non-humans (Smelik 2022, 58).

What I find relevant about professor Smelik's view on the term posthuman in the context of this thesis is how costume together with the person wearing it can expand into a kind of hybrid posthuman figure of both artificial and organic origin. This in-between-ness that transcends the traditional view on what it is to be human is fascinating. In this thesis I study this in-between-ness, costume as something that is not an organic being but could be perceived as more than a lifeless object. Through interactive connection the costume and human can possibly create a new morphed posthuman entity part human, part alien, part organic and part artificial.

Posthumanism as a theoretical background has affected the way I have approached the costume design process and the costume in project *Symbiosis*. The interconnectedness between species that is at the heart of the posthumanism ideals also forms the ideological core of this thesis.

4. Case study – *Symbiosis*

This chapter elaborates the process of creating the project *Symbiosis* from the first concepts to the final execution. The process has been divided into eight chapters to define different aspects and phases of the creative and practical process. However, even though I have organized the chapters in a linear fashion, it is important to note that the processes are overlapping and often simultaneous.

The research practices and methods including autoethnography and posthumanism are discussed in connection to my artistic work and practice to demonstrate how these chosen methods affected the process. In addition, the intention of this chapter is to demonstrate how the research questions were investigated through the practice of creating the project *Symbiosis*.

4.1 Interdisciplinary collaboration

When I started planning the artistic project for my thesis, I knew that working alone would be counterproductive. Already in the beginning I had an idea that I wanted to test the use of wearable electronics as part of the costume. Therefore, due to my lack of knowledge in building circuits and coding microcontrollers, I needed a partner who could bring to the team not just artistic but also practical knowledge on working with this kind of technology.

I contacted Professor Antti Ikonen from the Sound in New Media programme in Aalto University with my thesis plan to find out if any of the students might be interested in my project. This way I was introduced to Juha Perä.

Juha was looking for a Master's thesis project and found my presentation interesting. We met, and I gave him an overview of the ideas that I had for the project so far. At this point the concept was still quite abstract. The main research questions were already developed but the practical implementation of the artistic production was not defined. I had deliberately chosen not to develop the visual and narrative components of the work too far alone because I wanted that the result would be a work of collaboration.

We had insightful discussions about ideas that I presented which led to Juha joining me on the project. Combining my knowledge from the field of costume design to his knowledge from field of sound design and music gave the project a wider perspective and skillset.

Because the timeframe for the project was limited, we decided to divide the work so that I designed and made the costume while Juha worked with the sound design as well as the hardware and coding for the sensors.

As an organisation and visual working tool we decided to use Miro board. This turned out to be a helpful program for collecting both visual and written ideas on the same document and organize them in different categories. This way we could also see each other's work even when we were working separately.

In the beginning me and Juha worked a lot together to develop the ideas we had for the project. Once the plan was clear we proceeded seeing each other few times a week to check on each other's progress. Our practical work required different types of tools and environments so we would also work independently to make most of the time we had.

4.2 Introduction to the concept

My interest in science fiction and especially stories relating to alien encounters and new lifeforms was a strong inspiration when I initially started to plan the project. As we processed the ideas together three main themes, communication, connection, and metamorphosis were selected. The goal was to create a piece through which a person would be able to discover a new way of experiencing their immediate environment through interactive sound design.

When I first pitched my idea to Juha I showed him a YouTube video of talking oyster mushrooms created by MycoLyco. In the video by using data sonification and eurorack synthesizer the information passed between two blocks of oyster mushrooms is converted into sound (MycoLyco 2020).

What I found interesting with this video was that through this data sonification a communication otherwise completely invisible to us was exposed.

Inspired by this Juha introduced me to *ETHER*. According to the products webpage *ETHER* is a kind of anti-radio created by SOMA Laboratory that allows us to hear the invisible electromagnetic landscape that surrounds us by capturing radio waves without being tuned to a specific station. It captures all the interference and radiation making live electromagnetic field listening and recording possible (SOMA Laboratory).

Both of these examples investigate the idea of exposing a secret web of communication that surrounds us but usually goes unnoticed. We found this inspiring and took that concept as a starting point for the project.

We chose mushrooms as both visual and thematical subject for the project based on their way of communicating through a wide physical network called mycelium and their interesting alien shapes and textures. We decided to combine a visually organic look for the costume with synthetic sounds. This interplay between the artificial and organic elements became the core for both costume design and sound design in *Symbiosis*.

Based on this we decided the costume would act as a conduit between the visible and invisible world of communication. Similarly, to a mushroom the costume would be imaginarily connected to a wider network such as mycelium of other similar beings through which they communicate. Their communication would be otherwise silent to us but could be heard when in physical contact with the costume. In a way the costume would then work similarly to *ETHER*, making it possible for the person interacting with the costume to hear the otherwise silent communicational frequencies.

During the process Juha told me of an experience he had one day when he was walking outdoors. On this walk he saw a big tree and decided to go under it. Once under the tree he was enveloped by its big branches that created a new defined space around him. He then noticed that the tree was full of birds that started to sing all around him, surrounding him with their conversation. When he walked away from the tree that world which he had experienced being part of under it closed behind him.

We both felt inspired by this idea of suddenly being part of a world that has previously gone unnoticed. Our goal for the project then became to capture a similar feeling of wonder that Juha experienced when suddenly the space around him changed and he became aware of his environment in a new way.

To these concepts we combined the posthumanism ideals which were naturally introduced to us as a result of the soun-led design process. We decided to approach the costume not as a garment, but as an individual entity that can attach itself to the human body. We named the project *Symbiosis* to decribe the idea of the coexistence and merging of human and costume. In *Symbiosis* human and costume create a new posthuman entity. Posthuman in this context is viewed as a hybrid figure, human in alliance with non-humans, a figure in between the spectrum.

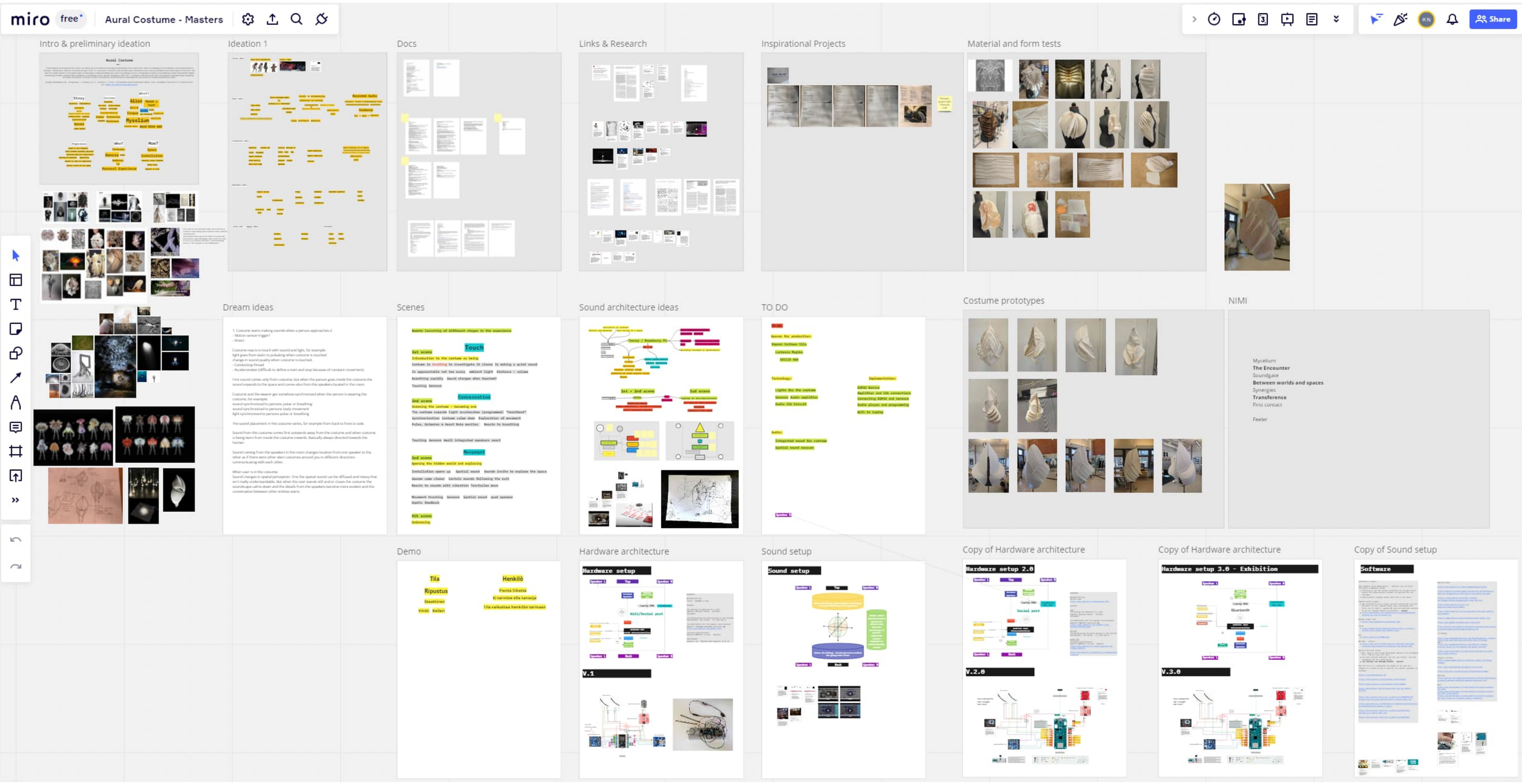


Fig. 3
An overview of the Miro board to illustrate how it was used to organize the project

4.3 Narrated installation

Our original plan was to create a short demo performance and have a dancer performing with the costume to demonstrate its functionalities. I had contacted students from the Dance programme in Uniarts Helsinki and found people who were interested, but unfortunately were unable to come due to overlapping schedules. The fact that we did not get a movement-oriented person working with us led the process to develop towards a more stagnant less movement-based form.

As the project developed further, we noticed the focus shifting from the outside to the inside, from the spectator's perspective towards the performer's perspective. This naturally resulted in the project evolving towards an installation piece curated for the person interacting with the costume rather than a performance that is meant to be experienced from outside as part of an audience.

Even though the form of the project changed, we had already started creating a narrative and choreography for the intended performance and decided to keep that narrative. This resulted in a type of hybrid piece which I have given the term 'narrated installation'.

The choreography created for the 'narrated installation' leads the participant through three different stages which I have titled *Approach*, *Contact* and *Communication*.

4.3.1 Approach

The first stage of the interaction with the costume is approaching it. A sound coming from a speaker located inside the costume invites the person to come closer and investigate the costume.

4.3.2 Contact

The second stage starts when the participant comes to physical contact with the costume. As the person goes inside the costume a distance sensor located in the costume is activated sending data to a microcontroller. This data then triggers a new sound phase, marking the established connection between the participant and the costume.

To further enhance the experience of merging with the costume the participant can place their hands in pockets placed inside the costume. Bend sensors placed inside the pockets are triggered by the movement of the hand. This allows the participant to manipulate the sound coming from the costume in real time, resulting in physical and audible connection between the costume and the participant.

4.3.3 Communication

The third stage is about experiencing the switch in soundscape from the singular speaker inside the costume to multiple speakers located in the space. These speakers are triggered individually when the person turns to the direction of the speaker. This makes it possible for the participant to experience and discover their environment in a new way through sound and movement. When inside the costume, the participant can no longer see the outside space, but instead can only hear the sounds coming from all around them. This connects the action to the original concept of the secret communication network. As a result, the costume expands to the surrounding space through sound and in that way like the *Human Harp* by Di Mainstone extends the performativity of the costume outside the human body.

4.4 Wearable electronics

This chapter discloses the technical and artistic decisions behind the use of wearable electronics in *Symbiosis*. As mentioned earlier Juha was responsible for designing the system for the hardware. For this he teamed up with Krisjanis Rijnieks from Aalto Fablab, who build and coded the system for us. Therefore, the focus of this chapter is to explain the more practical and artistic functions of the wearable electronics. Full technical details of the work can be found in this repository made by Krisjanis Rijnieks.

https://gitlab.com/kriwkrow/aural-costume

As a team we were interested in integrating the very digital and technological way of creating sound to my more hands-on traditional methods of creating the costume.

When combined with wearable electronics costume can become a type of active agent through which we can explore ourselves and our surroundings. This became one of the starting points when we began to think about the implementation of wearable electronics to *Symbiosis*.

The interactivity that comes from using sensors in costume naturally enforced the idea of costume as a co-performer-entity. This interactivity shaped the way I viewed the costume and approached it. As a result, I started thinking about the costume as a character instead of a representation of one.

In sound and costume there is an interplay of presence and absence, of physical and intangible. By using sensors to gather data and transforming it into sound it is possible to give interaction a sonic dimension in addition to the physical one. Because we planned the participant and the costume to interact with each other through movement and physical contact we decided to explore the use of touch and motion sensors for triggering sonic events.

To achieve a similar illusion of life and awareness as was present in the case of *Touch me not*, a work I presented earlier, we decided to have all the electronics hidden inside the costume. This way the interaction with the piece resembles less of operating a machine and more of a natural interaction. This choice was also important in reference to the use of posthuman theory as part of the framing of *Symbiosis* because it enforces the individuality and self-reliance of the costume.

4.4.1 Stage one and two, Approach and Contact

To enhance the privacy of the experience we decided to design the costume so that when the person enters it their whole upper body is enveloped inside the costume creating a new private space that is only experienced between the person and the costume. By inserting a small speaker inside the costume, we created the illusion of the costume having a 'voice', to further enhance the illusion of life in the costume. This way the sound could be localized to the costume, and seemingly have a physical connection to it. Similarly, to *Musical prosthetics* by Kate Reed the costume in Symbiosis is not just on object with sound, instead the participant can communicate through and with the costume.

We tested the placement of the speaker inside the costume by having a small handheld speaker and situating it differently in relation to our bodies. When we tried holding the speaker behind our necks we instantly felt that was the right placement for it. Having the speaker behind you and close to you makes the sound coming from it very personal and even intimate. Because in traditional conversation we are usually facing the source of the sound having the sound behind you creates more tension. We both felt that having the sound coming from behind created a good amount of uneasiness without being too uncomfortable. The interaction between the costume and the participant needed to feel safe and inviting, but also maintain a level of uncertainty and alertness. It felt only natural that a person who comes to contact with a new lifeform feels somewhat cautious in its presence.

To further immerse the person with the costume we chose to use bend sensors which react to physical interaction. This way the participant can physically connect with the costume, allowing them to have a clear action and response interaction with it.

The bend sensor is activated as the name suggest by bending it. Therefore, when we were thinking about the location for the sensors in the costume, we had to also consider the body of the person inside it. The joints are naturally the places in the human body where the bending motion occurs therefore making them great placement for the bend sensors. Because there is not much room to move inside the costume a small but effective movement was required. Therefore, the palm of the hand was the best placement for the sensor providing a large range of motion with minimal effort. I designed pockets inside the costume where the sensors were placed. The person inside can put their hands inside the pockets and by the natural motion of squeezing the hand activate the sensor.

4.4.2 Stage three Communication

In the early stages of the project we were playing with the idea of the costume as a wearable element that can be carried and moved around the space. For that concept we were planning the speakers located in the space to get activated when approached. However, during the process we decided instead to have the costume to be hanging from the ceiling. This made the range of movement for the participant significantly smaller. Because turning around was still an option we utilized that movement and started to investigate options on how to trigger the speakers located in the surrounding space by having the person in the costume turn towards them instead of walking to them.

To activate the speakers located in the space our first idea was to use a gyroscope sensor that measures the orientation and angular velocity of an object and place the sensor at the top of the costume. However, we noticed that this sensor did not generate the right kind of data for the task. We needed to measure the horizontal rotation of the costume around its vertical axis and determine the exact location points around this axis where the speakers were located. To achieve this, we decided to change the gyroscope sensor to a triple-axis magnetometer (compass) sensor which worked well for the task as we were able to code the location of the speakers to designated compass points. This way when the costume was facing for example to North the speaker which had North as the designated compass point was triggered.

Since in the first *Approach* stage of the installation only the sound coming from the speaker inside the costume can be heard the person interacting with the costume will connect the sound and the costume as one unity. This way the origin for the sound has been established and a connection between the sound and the costume formed. Unlike in the case of *Bells*, as mentioned earlier, where the viewer was allowed to form associations based on the sound of bells before that sound was physically connected to the costume.

For us it was important to form the visual connection between the costume and the sound in the first stage because of the alien nature of the sound material and the look of the costume could make forming the connection difficult later. It was also important to establishing the sound coming from the costume as the costume's 'voice' by making the costume interact with sound from the beginning. This way even though the sound material does not resemble any recognizable language it can be understood as a way for the costume to communicate.

As a result, when in the third *Communication* stage the sounds start coming from the speakers situated around the room outside the costume the person, who at this stage is inside the costume, can without seeing the source of the sounds make the connection that the sounds they hear from the outside are most likely connected to similar entities as the one they are interacting with.

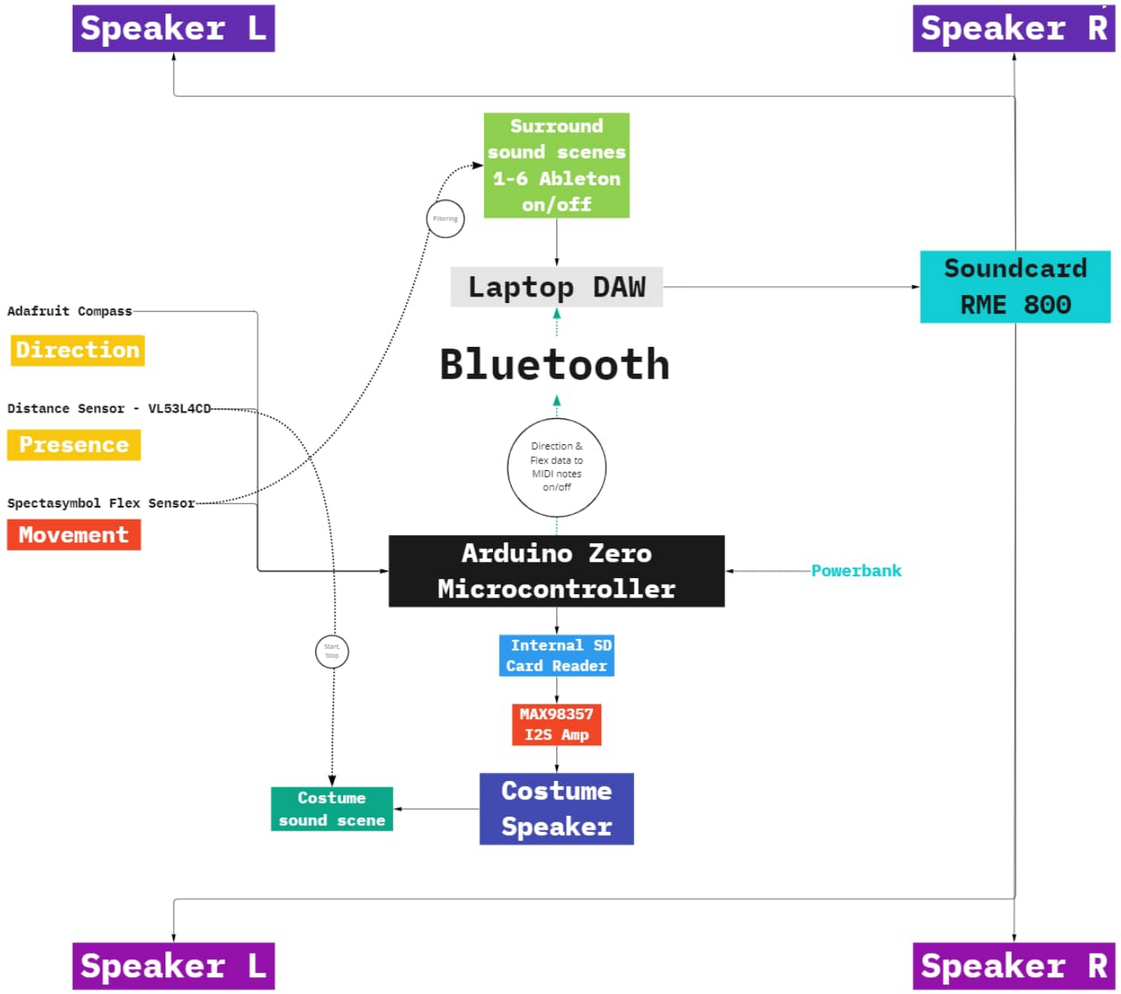


Fig. 4

Hardware architecture. This presents the plan for the connections between the microcontroller and the surrounding speakers as well as the sensors that trigger the interactions. © Juha Perä

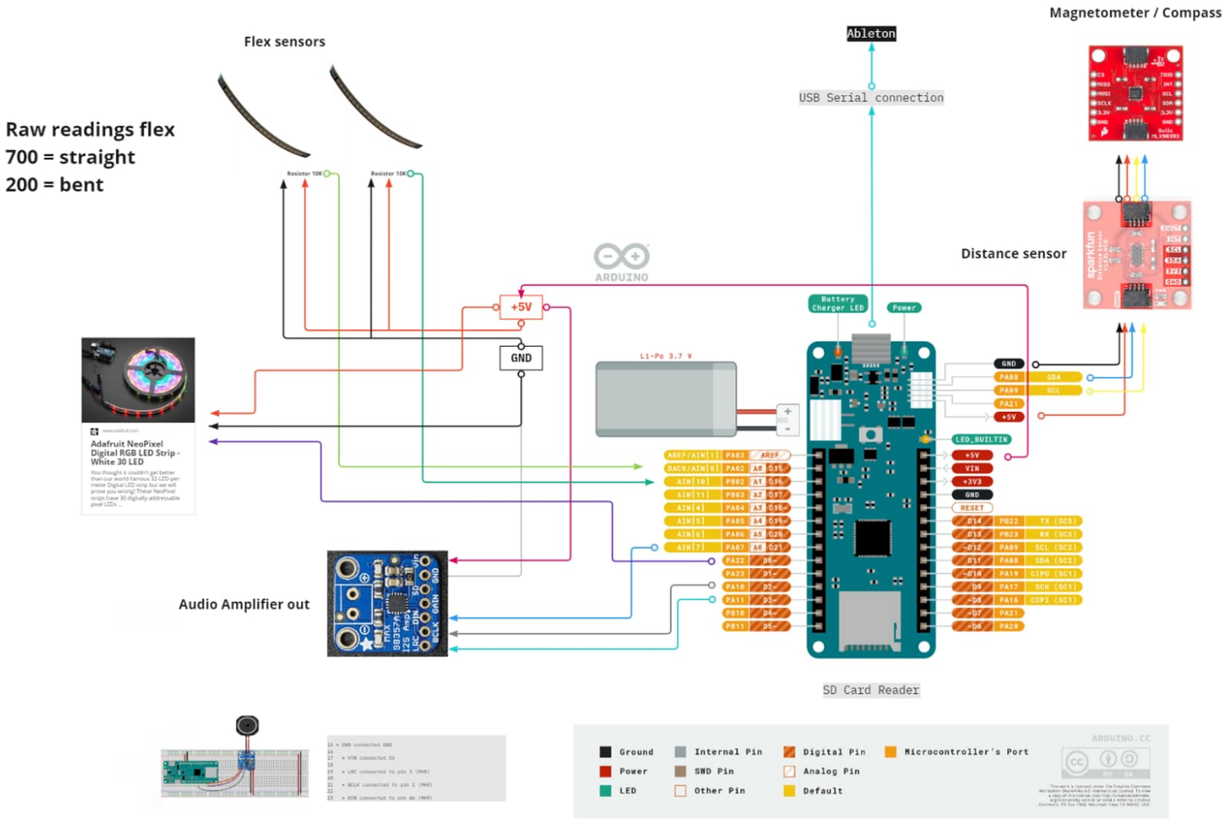


Fig. 5

Hardware architecture. This is a layout of all the separate hardware elements, like sensors, and how they connect to the microcontroller.

© Juha Perä

4.5 Sound-led approach to costume

In the project *Symbiosis* in stead of thinking about how we wanted the costume to look, we first started thinking about how we wanted the costume to sound like. Therefore, it was an important part of the early stages of the project to listen different sound materials and discuss as a team which elements and characteristics we wanted to integrate to the sound design in *Symbiosis*. Juha was going to create the sound design for the project from scratch so we were not looking for sounds that we could use in the project as is, but instead listened to sounds with the mindset of trying to find qualities and themes we liked. These qualities where then transfered to the costume as physical qualities in the design.

We both felt drawn to ambient sounds and nature field recordings. For example sounds of worms moving underground or the sound of water under ice. This led to the idea of combining real nature field recordings with digitally manufactured sounds. This concept of mimicking life through artifial means was transfered to the costume design as well. There is something intriguing in the concept of artifially creating an illusion of life. This became a unitive theme for both sound design and costume design.

As we were discussing how to use sound in the project the theme of communication was chosen as the main starting point. Becase one of the core characteristics of communication is interaction between two or multiple entities, we decided to implement interactivity to the costume with sound as the main medium of that interaction.

As the communication between alien lifeforms was chosen as the base for the sound design this also became the base characteristic for the costume. Fungi were chosen as the main inspiration for the concept of communication and the interactivity of the piece. Therefore, this also affected the look of the costume as we wanted to connect the sound and costume together both visually and thematically.

From the beginning of the project we had the idea of integrating sound into the costume by placing a speaker inside the costume's structure. This way the sound and costume would be physically connected as one unity. This resulted in the idea of us using sound as the 'voice' of the costume.

The physical placement of the sound to the costume affected how I approached the physical design of the costume. Because we had decided to insert a speaker inside the costume the shape of the costume was designed to support that function by creating a shape that would allow different ways for the person interacting with the costume to experience the sound.

Because the sound in *Symbiosis* represents the sound of the costume entity it was important to combine in the sound material elements that supported the idea of sound as the costume's 'voice'. Instead of making the costume sound human we emphasized the concept of the costume as an alien lifeform by distancing the sound from human speech. Even though it was important to create a connection and synergy between the human and the costume we decided that it was essential that the human would be the one to adjust and become more alien in the event of the encounter, instead of the other way around.

For inspiration we listened examples of communications between different animal species. When we were listening and analyzing different sound samples, we realized that sounds with irregular pauses had a closer resemblance to speech pattern than monotonous and continuous sounds. Generally higher frequency sounds seemed to be coming from a closer distance than lower frequency sounds. We decided to combine these elements to create a continuous low frequency humming sound that would create the base sound for the communication network. We felt drawn to sounds that seemed to be coming from somewhere deep underground to give the illusion of distance but also in reference to mycelium, the underground structure of a fungus, which gave the inspiration for the concept of *Symbiosis*. To this base we then added the more rhythmically varied higher pitched sounds as the individual lines of 'speech'.

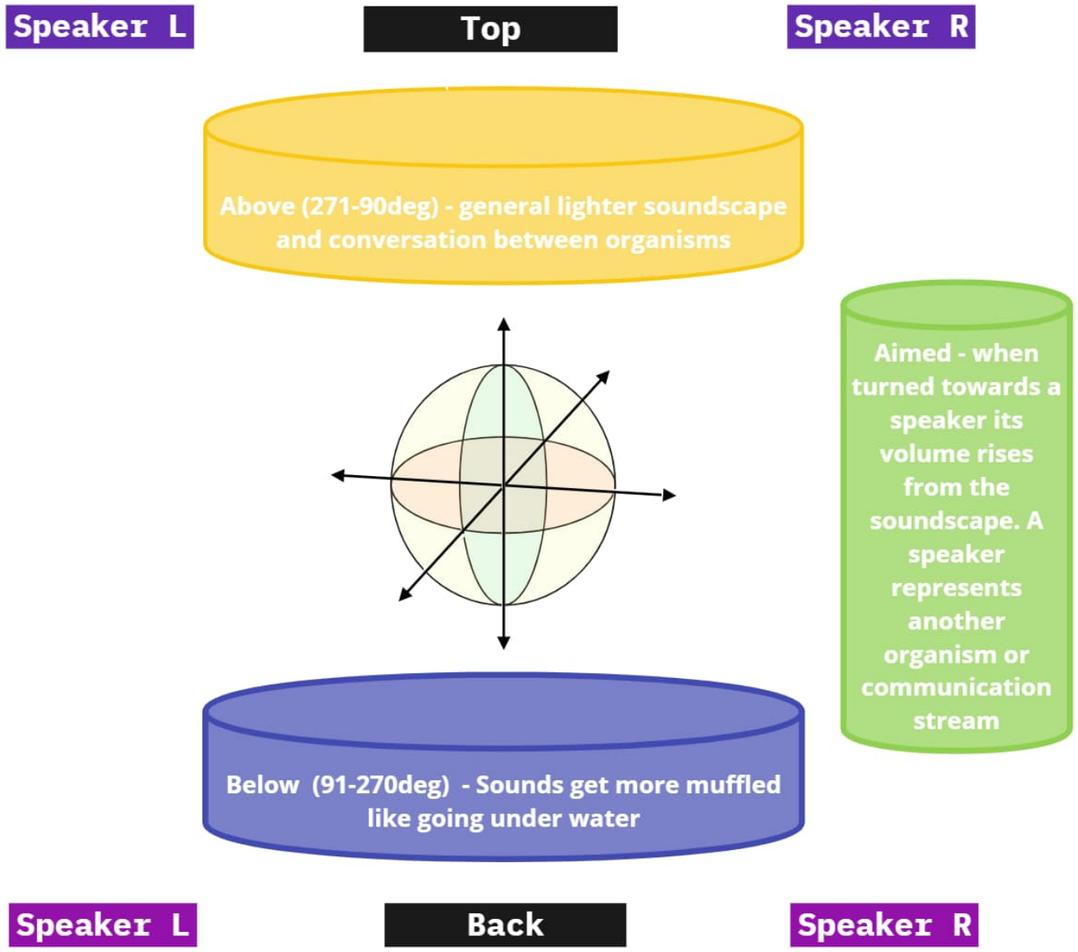


Fig. 6

A graphic design of the sound setup with the costume in the center and the four speakers around it. The costume rotates to activate the speakers one at a time. © Juha Perä

Because we wanted to study the theme of combining organic and synthetic elements, instead of just mimicking organic sounds we decided to combine real nature field recordings with synthetically manufactured sounds. The idea was to mimic organic sound through digital means. Because the sound and the costume were thematically linked it was important to emphasize the organic feel of the costume with the organic feel of the sound.

For the film we wanted to emphasize the idea of the human and costume merging together. We felt that it was important to add real human sounds like breathing and the sound of footsteps to the sound design to create an aural presence for the human character.

4.6 Creating the costume

Biomorphic as an art term is explained in Tate website as follows:

> Biomorphic forms or images are ones that while abstract nevertheless refer to, or evoke, living forms such as plants and the human body (Tate, n.d.).

The term biomorphic and how it is here described worked as one of the visual starting points for the design of the costume. To enforce the creature-like and alien aspects of the costume the design needed to be abstract enough so that it would not evidently represent a specific species but organic enough to make a clear resemblance to the natural world.

I had been collecting images and making mood boards already before I started working with Juha since I find that looking and organizing visual imagery helps me to develop my ideas about themes and narrative. These mood boards served as visual tools for developing the visual look of the costume in the early stages as well to work as conversation starters for our mutual meetings.

As the main themes for the project of costume as communicative alien organism were developed, based on these I made a second round of mood boards to investigate their visual possibilities. These included the idea of costume having visual reference to the look of mushrooms and costume as an alien entity.

Mushrooms had become a starting point for the idea of the function and narrative of the installation. Therefore, it felt right to connect the costume to mushrooms also visually. This worked well in accordance with the idea of the costume as an alien entity which was developed in connection to the post humanistic ideals of distancing the costume from a garment to something closer to a lifeform.

As a result, I approached the costume in a different way compered to ‘normal’ clothing. For example, in the design process the costume became more detached from the human body, even though it was designed to fit around the human figure. Instead, the costume started to develop like a sculpture resulting in an entity existing both independently and in contact with the human body. The process gained qualities similar to puppet making, where you bring to existence a piece that has a certain personality and character to it. Art historian Joanna Kordjak writes about animating objects that is so present in puppetry and the feeling of uncanny related to puppets that rises from the liveliness in the lifeless.

> For no matter how much we deny a primitive belief that objects have a life and a power of their own, we still — despite common sense —experience a sense of anxiety when confronted with a puppet. Puppet theatre thus makes us aware that the concept of human superiority over the material world may be somewhat exaggerated. The uncertainty inherent to this form of theatre, stemming from the ambiguity of the puppet as an entity suspended between being alive and dead, moving and still, human and inhuman, made it possible to describe it using the Freudian category of the uncanny (*Unheimlisch*) (Kordjak 2019, 11-12).

I felt connected and drawn to this idea of costume suspended between being alive and dead. It was interesting how naturally I started to address the costume as I would address a person despite

of knowing it to be a lifeless object. What I found especially interesting in Kordjak's text was the suggestion that the feeling of discomfort arising from the interaction with puppets could relate to the feeling of losing control over something we thought was predictable and easy to comprehend. This connected with the posthumanism ideals where this shift of control and human superiority over the material world is being re-examined. I wanted to examine this idea of control with costume as an active inhabitant of our bodily space, like in the case of *INCERTITUDES*, where the costume moves indepently from its wearer.

In the beginning of the design process, I was playing with the idea of the costume latching onto some part of the body. the idea was always to somehow connect and merge the costume and the human participant together to explore the state of in-between-ness and the theme of metamorphosis.

These themes were also explored in *Homo Viridis*, a work I mentioned earlier in the text. What I found especially relevant in *Homo Viridis* in relation to *Symbiosis* is the mimicry of organic matter with artificial means and the merging of the human and nonhuman. The pneumatic sleeve used in the piece is a wearable object, but it also becomes part of the human body as a prosthesis. The sleeve is not just a sleeve but also a physical extension of the human body. According to the artists *Homo Viridis* could be seen as an argument to support the idea of posthuman as an entity that consists of both organic and artificial components connected through soft robotics (Christiansen, Joergensen, Belling, A-S & Beloff 2020).

From these starting points and with the visual imagery of the mood boards in mind I started making the first round of sketches with a collage method to see which part of the human body to cover with the costume. I decided to go with the upper body for a few different reasons. Firstly, the face is seen as visually our most individually defining feature, hence why our passport has a picture of our face instead of some other body part. Therefore, covering the face is seen as covering the person's identity. By covering the face with the costume, it is possible to distance the person from their former self making the transition more personal for the wearer and more dramatic for the viewer. Secondly, this also worked best for having the sound inside the costume.

Designing the costume this way the costume becomes like a huge headphone that covers the whole upper body creating a private space for sound and the participant.

To find the final look and shape for the costume I started making a second round of sketches first with digital collage method of cutting and combining imagery in Photoshop and then by drawing with pen on paper. At this stage the functionalities and actual wearability of the costume as well as the placement of the sensors and sound in the costume became important aspects to consider in the design.

For example, when we were thinking about how the costume could be used the first idea was to have the costume on the ground so the participant could pick it up and put it on like a coat. However, this action felt awkward and resembled too much of putting on a piece of clothing. We felt that the costume needed to appear more autonomous in its presence. As a result, we had to approach the design differently.

Many of my reference images where of lamps or other artworks hanging from the ceiling and this gave me the idea of having the costume hang in

Fig. 7

Mood board ALIEN,

picture 1: Ingo Maurer,

picture 2: Neri Oxman, Vespers series2, mask3,

picture 3: Iris van Herpen, snake dress (2011),

picture 4: Nick Crosbie, Bone light (2000),

picture 5: Hayley May and Fiona Christie, Second Skin (2009) © World of WearableArt,

picture 6: Nuro Oh,

picture 7: Adam Fuss,

picture 8: Local Androids, Like Living Organisms,

picture 9: Ana Rajcevic, Animal (2012) © Fernando Lessa

Picture 1

Picture 2

Picture 3

Picture 4

Picture 5

Picture 6

Picture 7

Picture 8

Picture 9

Fig. 7

Picture 1

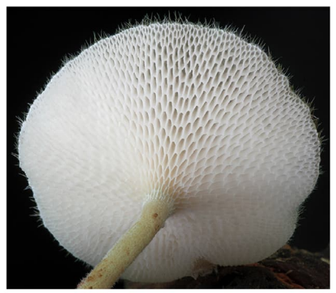
Picture 2

Picture 3

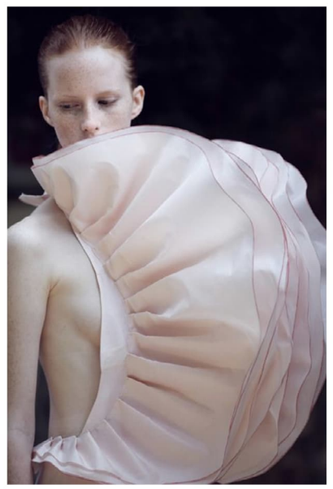
Picture 4

Picture 5

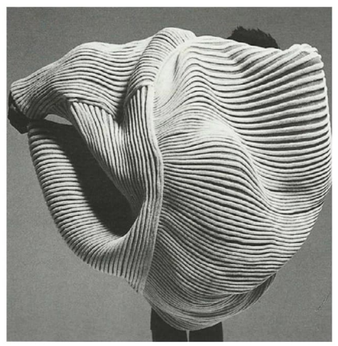
Picture 6



Picture 7



Picture 8



Picture 9

Fig. 8

the air. By hanging the costume from the ceiling, it was possible to have it at the eyelevel of the person approaching it making the costume appear more equal in the event of the encounter. Alternatively, by placing the costume slightly above the eyelevel of the participant would literally give it the higher ground in the situation. This worked better thematically in the frame of the posthuman thinking because it dismantles the position of human as the dominant party in the interaction.

I presented this idea to Juha, and he agreed with it. This worked well for him since having the person fixed in one place in the space instead of having them be able to move freely with the costume made it easier to design the spatial sound around the costume. This idea of having the costume stagnant in the space also enforced us to move towards making this an installation piece instead of a performance.

After we decided to have the costume hang in the air, we needed to find the right method of doing that. At first, I thought about trying to connect the wire or rope to the costume in an aesthetical way. This would have connected with the theme of mycelium visually. However, because we managed to book a black box studio in Valofirma for the shooting of the film we decided it would be an interesting idea to use black rope instead. This way the rope would merge to the black background of the space creating an illusion of the costume floating in the air.

Already at the mood board phase I had become interested in using pleats as the main structure of the costume. With different types of pleats, it is possible to create voluminous three-dimensional shapes as well as to add strength to the costume's structure. In addition, the shape language of the pleats mirrored the shape of mushrooms. I made several tests with different pleating techniques on fabric to find the most fitting shapes.

To support the idea of costume as a posthuman creature it was important to choose a material for the costume which resembled more the texture of skin rather than textile. I had worked with this same topic on previous material courses creating samples with the goal of trying to make fabric resemble organic matter. From these samples I found a few that resonated with what I had in mind. Both samples had a texture that resembled skin with veins showing underneath.

The visceral look of the material samples resulted in an interesting discussion about the approachability of the costume. To me these samples were beautiful, but I recognized that the look could also be experienced as off-putting and grotesque. We wanted to keep the fleshy and organic feel of the costume without compromising it becoming too uncomfortable to look at.

As it was important for us to create an illusion of life in the costume, in addition to sound it was part of the plan to add light inside the costume that would pulsate like a heartbeat. This played an important role in my material choices. I played around with the possibilities of multilayered heat bonded fabric that would reveal itself differently when lit from behind. This resulted in multiple tests of backlighting materials to find the most interesting and suitable option.

As a result, I decided to go with a web-like lace that was heat bonded between two transparent layers of fabric. When backlit with a warm orange light this material gave the illusion of veiny skin. The warm orange light created a similar effect to when you light your hand from behind in a dark space and the skin appears glowing red, giving the textile a more visceral feel.

Because the costume was going to be hanging from the ceiling and the structure incorporated a

Fig. 8
Mood board FUNGI,
picture 1: © Steve Axford,
picture 2: Amaya Arzuaga Spring RTW (2011),
picture 3: Iris van Herpen Escapism (2011),
picture 4: Grace Tan n. 254 (2008),
picture 5: Natan Suglob,
picture 6: © Steve Axford,
picture 7: © Steve Axford,
picture 8: Maryam Kordbacheh,
picture 9: Issey Miyake, Seashell coat (1985)

Fig. 9

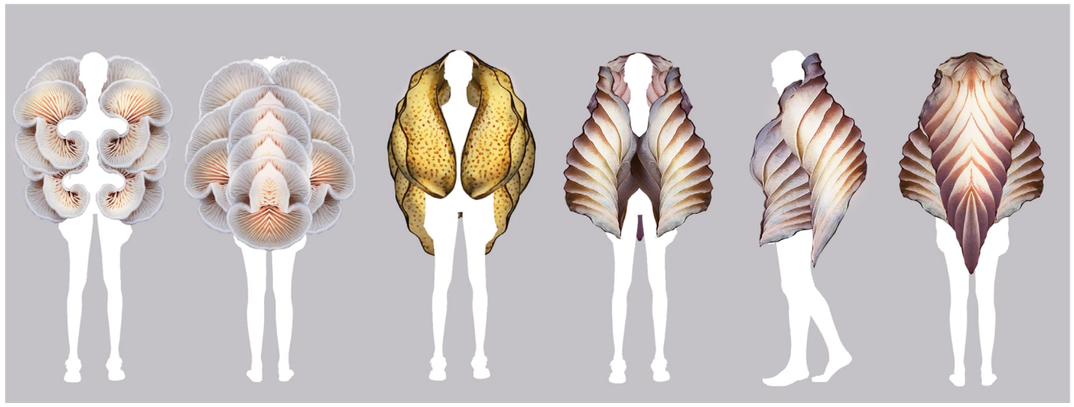


Fig. 10

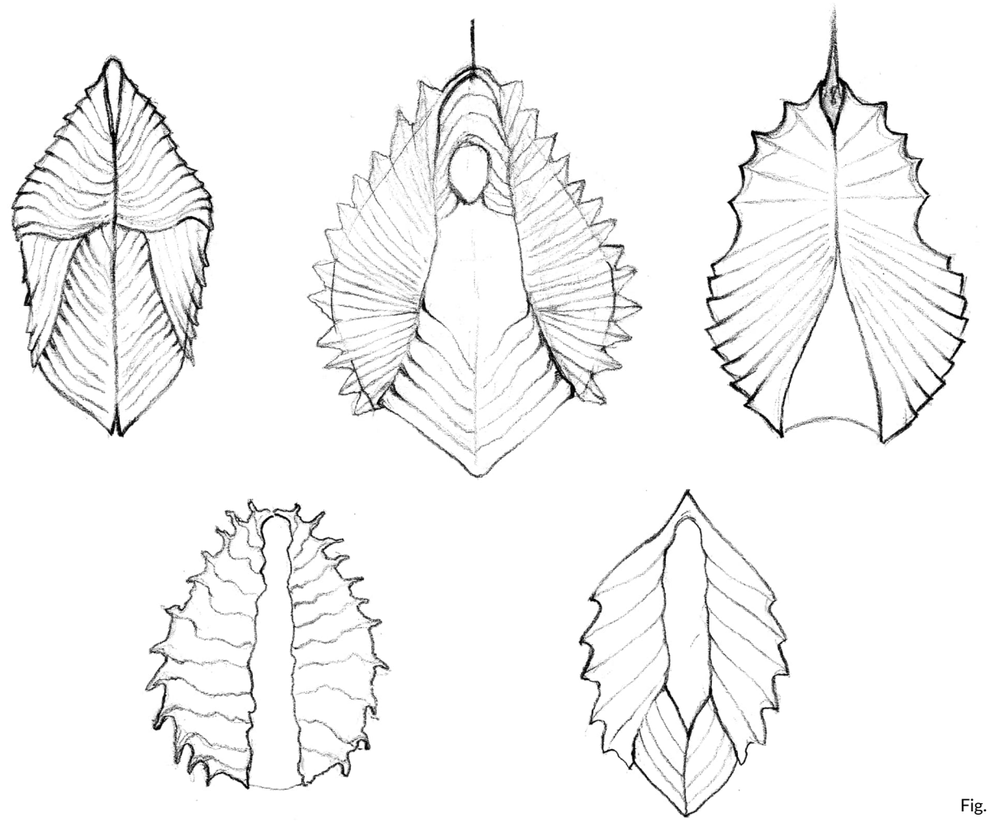


Fig. 11

Fig. 9

First round of sketches of different mushroom shapes on the human body made in Photoshop with a collage method.

Fig. 10

Second round of sketches to develop the form of the costume made in Photoshop with a collage method.

Fig. 11

Sketches with pen on paper to find the form of the costume

lot of pleats the fabric needed to be both sturdy enough to hold the pleats and light enough to hold the round shape I was going for. Therefore, I chose to use acetate lining fabric, white spiderweb lace and very thin nylon organza heat bonded together. This created a material that had the skin-like texture without being too heavy, but still sturdy enough to hold the pleats. Also, thematically using only synthetic fabrics was fitting with the theme of artificially mimicking organic material.

Finding the right shade for the fabric was challenging. I made multiple tests with synthetic dyes to try out different combinations. Because the space was going to be dimly lit, the color of the costume needed to be light so that it would stand out. To keep the skin-like element in the costume I at first experimented with shades close to my own skin tone. However, even though nice in small scale we were wondering if the result in large scale would be too grotesque. I therefore decided to go for a colder pink tone with nice fleshy quality while remaining stylized enough to be considered as inviting.

When the shape and the materials of the costume had been decided I started making small scale prototypes with paper to find the final form for the costume. When I found a form that I liked I created slightly larger prototypes made from fabric and then eventually large-scale prototypes made from fabric. The thought process of transferring a complex three-dimensional shape on paper as two-dimensional patterns was an interesting work full of trial and error.

Even though the material for the costume was rather light, the large scale of the costume resulted in the piece becoming too heavy to hold its own form. Therefore, I needed to insert metal wires inside the costume as support structures to hold the round shape that I had envisioned. This metal skeleton worked well for integrating the electronics inside the costume as I was able to create a removable pocket for the hardware that could be attached to the metal wires.

Fig. 12
Material tests

Fig. 12









Fig. 13

Form tests with different pleating methods.

Fig. 14

Top row: small scale prototype

Middle row: first of many large scale prototypes

Bottom row: final costume

Fig. 13







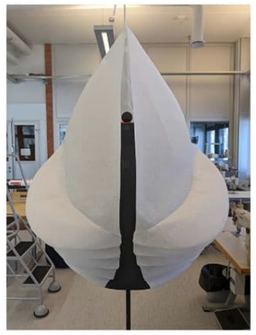





Fig. 14

4.7 First test in the studio and filming of the short film

To develop the work in practice it was an important part of the process to work with the costume in a setting where we could evaluate its characteristics and functions with minimized outside distractions. This was especially important for the testing of the sound design we had created for the space to see how it would work in connection to the costume, space, and movement-based interaction. For this purpose, we arranged a few days in a studio environment to take time to work with the costume as well as to create a visual documentation of the work including photos and a video recording. At this stage the hardware of the costume was assembled but not yet functional, since the code was still in progress. To get around this we decided to manually demonstrate the functions of the costume to create the illusion of interaction for the video.

Because we managed to get a professional cinematographer Italo Moncada to join our team, together with him we created a narrative for the video as well as the visual look, including lighting and storyboard. Due to us having access to professional studio environment, as well as a cinematographer, larger scale artistic possibilities for the execution of the video were presented to us than what we had originally planned. As a result of this, as mentioned in the *Introduction*, this video grew in scale to become an artistic project of its own. Therefore, it is more appropriate to use the term short film to describe the result.

To be able to create the process loop of working in turn from the inside and outside perspective it was important for us to have a performer for the studio who could give us their experience of interacting with the costume as well as to appear with the costume in the visual documentation. This would allow us to take a step back and observe the work from a distance. Aurora Frestadius, my friend and colleague with background in costume design as well as new media, joined our team to fill that role.

Now that we had the opportunity to include a performer to the project it became important to decide how we would represent Auroras character in relation to the costume entity. The wonderful part about making a performance instead of an installation is the possibility to extend the worldbuilding and visual narrative to the performer.

Due to a time limit it was not possible to design and execute a costume for Aurora from scratch. However, we have a variety of costumes in the school wardrobe. From these we were able to pick the best options.

I arranged one fitting session with Aurora where we tested and discussed different types of options. The two opposite starting points were to eighter have the costume to be as ambiguous as possible in relation to cultural aspects such as professions and time periods or to choose a stylistically opposite route and make the outfit recognizably a modern-day character.

We decided to go for the more ambiguous and stylized look. Visually similar looks on Aurora and the costume entity emphasized the idea of a more seamless metamorphosis when the two united to create a new posthuman lifeform. Therefore, I chose clothing with similar textures and colors for Aurora's character as the ones used in the costume entity.

We had the studio reserved for three days. The first day was spent getting all the equipment to the studio and setting the costume and lights. The second day was fully reserved for the shooting of the short film. The third day was a day for us to take time with the costume and the space to test our ideas for the installation. This included playing and listening different sound materials that Juha had created as well as testing the placement of the speakers in the space. To gather hands-on in formation on the function of the installation choreography we also tested the movements and interactions we had planned to be performed with the costume. At this point the development of the sound material was still in progress, so this was a good opportunity for us to listen and discuss about the material Juha had so far created and to see how it worked in the space with the costume emotionally and narratively.

Fig. 15

Screenshot from the short film © Italo Moncada

Fig. 16

Because we were not recording any live sound while filming, we were able to play the sounds Juha had created from the speakers in the space during the shoot. This was important for Italo and Aurora to understand the overall mood of the work as well as to demonstrate narrative changes in the choreography which were embedded in the sound changes and triggered by interaction.

Because the narration and backstory of *Symbiosis* is built on the sound design for the development of the artistic process it was fundamental to have a silent space where we were able to play the sound narrative from start to finish.

We tested the physical actions with the costume to see how easy it was to get inside the costume as well as to move in it. It was also important to test locating the sound sources coming from the surrounding space and their direction when inside the costume. Pinpointing the general location of the speaker without visual guidance was an easier task than I had expected. This was an important outcome because we needed the person inside the costume realize that when they are facing a certain direction in the space a sound source from that direction is triggered.

It was also important to test with Aurora how she physically felt inside the costume. I had designed the costume according to my own measurements, which matched closely to those of Aurora's. Therefore, we were able to get from her realistic feedback regarding the fit of the costume and her level of comfort wearing it. For the development of the costume, it was important to gain this outsiders perspective.

During the time in the studio, we also noticed that the placement of the bend sensors inside the costume could be designed better in terms of accessibility and function. To make the experience of using the bend sensors for the participant more effortless and intuitive the placement and structure for the sensors would need to be developed for the installation.

We noticed that there was so much more weight on the costume than what we had anticipated, that the metal wires supporting the structure were starting to bend even during the three days of having the costume hang from the ceiling in the studio. Therefore, for long time exhibition purposes these structures would need to be enforced.

Fig. 17

Even though we were not able to test the interactive sound system of the costume in the studio with Aurora we managed to manually get some interactivity to the costume by having the light inside the costume to pulse. When the costume was alone the pulse was steady and calm, when Aurora went closer and touched the costume the light started beating more rapidly. Even though we did not manage to get the LED lights that we intended to use for the project working in time for the tests in the studio, we came up with a less technically sophisticated solution of using Christmas lights and a light dimmer plug that had a manually operated rotary knob for controlling the brightness level. This way we were able to demonstrate the effect of the pulsing light manually and add the interactive feature to it. While we were filming, I was sitting on the side of the room controlling the knob and creating the pulsing effect so that it corresponded with Aurora's actions. This gave the costume illusion of life and interactivity that we were hoping for.

Our original plan for the LEDs inside the costume was to have them connected to the microcontroller and coded to pulsate at designated intervals. We were not planning to add the interactive change of rhythm. Realistically that would have been too time consuming for this project. However, it was interesting to test that in the studio environment and see that it was an intriguing idea that could be integrated into the next version of the costume in the future.

Fig. 16 & 17

Screenshots from the short film © Italo Moncada

Fig. 18

Fig. 19

Fig. 18 & Fig. 19
Stills from the short film © Italo Moncada

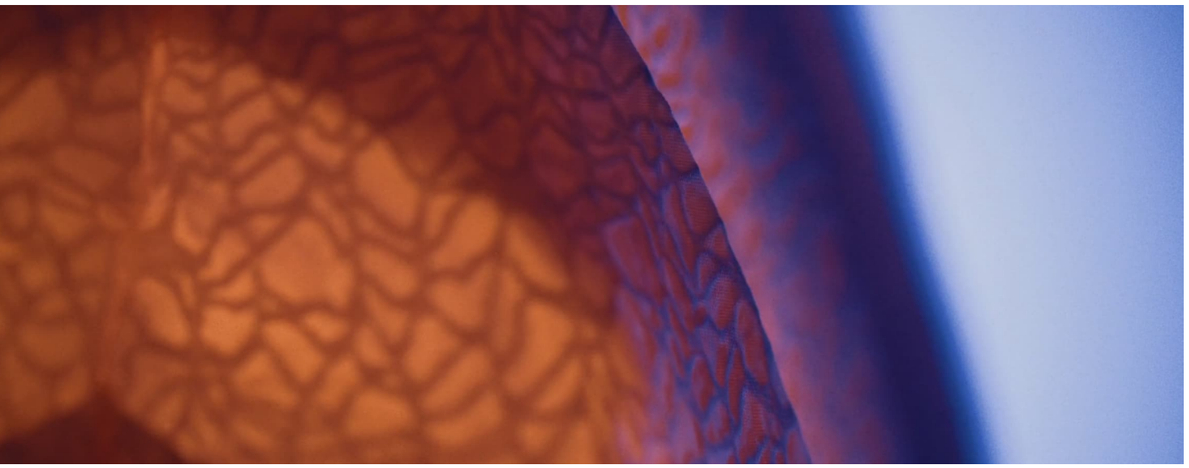


Fig. 20

4.8 Digital Fabrication Showcase 2022 — First public demo

Symbiosis was exhibited as part of the Digital Fabrication Showcase in Aalto University 7.11-19.11.2022.

This showcase demanded an exhibition setting so the components and performative properties were limited to what was functional in the exhibition context. Limited number of interactions were chosen also because at this point the system was still a work in progress.

Because in this setting we decided not to allow the people attending the exhibition to enter the costume, we decided instead to present how the costume activates the surrounding sound sources when faced to a specific direction in the space. To enable the demonstration of the system the costume was hung from the ceiling, allowing people to turn the costume around and in that way explore how the system works. To create the levitating feel we used a thin metal wire to hang the costume. The metal wire blended to the background of the space, making it appear as if the costume was floting. The costume was set up hanging in the exhibition space above a black box which had hidden inside it four speakers, one in each corner. The magnetometer sensor integrated inside the costume reads the orientation of the costume to launch the sound streams from the direction of each speaker. The sensor is connected to a microcontroller, which is connected to a laptop via Bluetooth. This way the sensor sends information through the serial connection to audio software. The audio is then played back through Ableton live session.

In addition to this an LED light strip was inserted in a tube inside the costume that ran across the back ‘spine’. To create the illusion of life into the costume the LED strip was connected to the microcontroller and coded to have a pulsating affect. In addition to this a different color was coded for each of the four sound streams so that the change from one speaker to another was also visually demonstrated through the change in the colour of the LEDs.

To demonstrate the wearable aspect of the costume the short film we had created with Italo Moncada was presented on a screen in the exhibition space.

Fig. 20

Screenshot from the short film © Italo Moncada

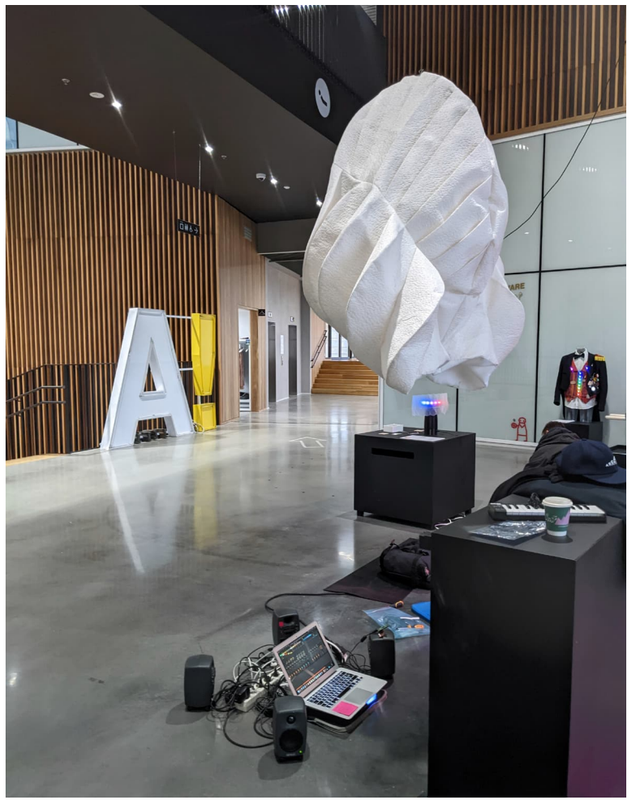


Fig. 21

Fig. 22

Fig. 21

Setting up the costume for Digital Fabrication Showcase exhibition.

Fig. 22

The costume on display at the Digital Fabrication Showcase exhibition. All the speakers and the laptop running the sound system are hidden under the black pedestal. The connection to the microcontroller hidden inside the costume runs through Bluetooth so no visible wires were needed.

Fig. 23

Fig. 24

Fig. 23 & Fig. 24
Screenshots from the short film © Italo Moncada

5. Conclusion

In this chapter I am going to discuss the key findings of this research discovered through the artistic production component *Symbiosis*. The definition of artistic research according to Borgdorff is to articulate the non-conceptual knowledge that is part of the creative practice and artistic products (Borgdorff 2010, 47). My aim is to articulate, define and verbalise that knowledge gathered in the process of creating *Symbiosis*. By analysing the challenges, we faced during the process I develop my own artistic practise and offer practical insight to other costume designers who are interested in working on a similar topic.

In this project the technology and sound are interwoven together and therefore I think it is important to talk about the technological side of sound and sound production as well as the artistic findings that emerged during the process.

5.1 Approaching and experiencing costume

Can sound-led design process open interesting new ways to approach and experience costume from costume designer's perspective?

The interactivity which resulted from the sound-led approach, shaped the way the costume was viewed and approached in the process. As a result, the costume became its own character and work of art which existed in contact with the human body but also independent from it. With the use of tactile and sonic interaction the costume became an active agent through which the participant can explore their environment.

The way we used sound as the costume's voice led to approaching the costume as an interactive piece which influenced the decision to integrate wearable electronics to the costume. This resulted in sound being manipulated by physical interaction with the costume. We approached the costume as an interplay between the immaterial and tactile qualities of sound, which led to the idea of the costume as a conduit between the visible and invisible world of communication.

The focus to experience the costume shifted from the outside to the inside, from the spectator's perspective towards the performer's perspective. This naturally resulted in the project evolving towards an installation setting curated for the person interacting with the costume rather than a performance that is meant to be experienced from outside as part of an audience.

The integration of sound to the costume resulted in approaching the costume not as a garment but as a creature that can attach itself to the human body. This decision affected the shape and function of the costume and the way we approached the work with the theme of mimicking organic material through artificial means both in the visuality of the costume and the sound design.

As a result of the sound-led process the costume was approach as a multi-sensory experience. It became important to experience the costume with multiple senses, through visual, haptic, and aural interaction.

In addition, by integrating sound to the costume, the costume became an object that was to be experienced more like a companion than just a wearable object.

Fig. 25

Fig. 26

5.2 Performativity of the costume

Can sound be used as part of the costume to expand costume's performative and narrative qualities and if so in what way does the presence of sound change the way the costume is perceived?

Based on the experience gained through this project I would argue that sound can expand costumes performative and narrative qualities. In the case of *Symbiosis* sound became the leading element through which the costume performs and interacts. The different stages in sound design create the narrative of the installation piece and guide the participant through the interactions embedded in it.

As a result, interaction with the costume became an important part of the narrative and resulted in combining sound and costume in technically mediated tactile interaction. Approaching costume design in this way resulted in a multifaceted performativity. The work proposed varied forms for the final form of the work ranging from live performance and installation to film. The work can be modified to fit all these different forms which all give it different narrative and performative qualities.

Sound became the narrative force which defined the character of the costume including its shape and functionalities. The physical implementation of sound into the costume itself affected the shape of the costume and how it was positioned in relation to the human body. For example, to create a private space for sound and the participant, we designed the shape of the costume to accommodate this function.

The implementation of sound to the costume created new levels of spatiality to it. In addition to the physical space created inside the costume the spatiality of the costume was expanded to the surrounding space through sound. This created a new point of view to the costume as an environment. The costume became part of the space through the interactive sound design which connected the costume and the space together. In this way the spatiality of sound affected the way we approached the spatiality of the costume as these two became intertwined.

The work explored the in-between-ness, the posthuman idea of costume as an entity that can morph together with the human body. This enforced the idea of communication between the costume and the participant and the use of sound as the 'voice' of the costume. The sound became part of the costume's narrative as the associations the participant forms from the visual look of the costume and the sound design combined together form the full story of the piece.

5.3 Costume design process

How does implementation of sound as the leading element of the costume design process affect how the process is approached and how it is conducted?

Approaching costume design as a sound-oriented process that utilizes wearable electronics in triggering sonic events had both similarities and differences with text-based processes. What shifted the most was the role the costume took in the process as an individual entity and a co-performer. Sound became a way to be in dialogue with the costume. This led to the costume becoming a character of its own instead of a visual presentation of another.

The integration of wearable technology to the costume affected the process of designing the costume because the added need to take into consideration the interactive qualities and placement of the electronic components. This added an interesting new element to the design of the shape and functionality of the costume especially because we wanted the electronic components to be hidden.

The biggest challenge with the integration of the technology was to come up with a functional solution to make detaching and attaching as many of the components as easy as possible. If some of the components had a malfunction it was important to have access to the components even after they were integrated to the costume. This meant that the integration of the hardware required to be designed in a way that was easily accessible.

Fig. 25 & 26

Screenshots from the short film © Italo Moncada

The sound-led process led the design of the costume to stand somewhere in between a wearable and a tactile-sonic sculptural object. Integration of wearable electronics to a costume design process creates an overlap of functions. This makes the terms used to describe costume fluid and overlapping. The costume in *Symbiosis* can be approached from many different viewpoints, as a technological, interactive, musical, wearable, performative, narrative and collaborative object. This makes defining the work challenging but also invites new ways to experience and approach costume.

This type interdiciplinary collaboration also expands the role of the costume designer as the roles between the team members become overlapping. As the founder of this project in addition to costume design I have learned about wearable technology, sound production as well as film production. My role has included the role of a producer, make-up artist, costumer, performer and lighting technician. Expanding your role outside your comfort zone can be intimidating, but for the development of our field we think it is important to take different roles and in this way expand our artistic thinking and practice.

By taking the performers position in the process of interacting with the costume I was able to get more familiar with its performative and sensory properties. *Symbiosis* is focused on the sensory aspect of costume and therefore it was logical to work with the costume in a physical way that allowed me to experience it not just visually, but also through the sense of hearing and touch.

This led to the the process loop method of working with the costume in turns from the ‘outside’ and ‘inside’ perspective. This way of working integrated to the costume design process the sensory and physical qualities of costume.

The methods of working from the ‘inside’ was used in the process of working with the wearable electronics, the placement of sensors and the design of the sound environment. For example, when we were testing if it was possible to locate the direction of the sound sources in your surrounding space without being able to see them, as is the case when the participant is inside the costume. It was also important to test how being inside the costume feels and functions already in the prototyping phase to determine the shape of the costume as well as the best placement for the sensors and the speakers.

In the beginning of the process, I had planned to work more in a similar way to Østergaard and Dean by letting the form of the costume develop from material experiments. However, the process of designing the visual look of the costume formed naturally from our concepts with the narrative story we created and the sound design we developed from it. In this case the sound-led process resulted in the formation of the shape of the costume before I started to experiment with different materials. However, as the process of designing the costume developed the bodily interaction and functionalities of wearing the costume became more prominent in developing the costume further.

I would argue that if we were using the sound created by the materials of the costume in a movement-based performance the material focused way of working described by Østergaard would have been more fruitful.

However, in this case using wearable electronics and sound material that was created separate from the costume it felt more natural to approach the design phase more from the ‘outside’ perspective. Nevertheless, the way of working from the ‘inside’ was something that I relied heavily on after the first full scale prototype of the costume was finished and I was physically able to enter the costume and have a sensory experience with it.

The main themes for the work became communication, connection, and metamorphosis. The communication aspect was explored by using sound material that was created as the ’voice’ of the costume. Communication became the theme around which the sound design and the narrative was created. Communication at its core is interaction. This was achieved by using interactive technology in the costume.

Connection between the human participant and the costume was explored through physical interaction. Also, the costume’s and participants connection to the space was explored through the interactive sound design.

Metamorphosis was chosen as one of the themes in designing the visual look for the costume. Therefore, it was important to take into consideration how the costume connected with the human body.

Because the work with the sensors was unpredictable and time consuming the project took longer than anticipated. The many variables and surprises that are characteristic to wearable electronics projects in the arts affect the design of the costume as well as the schedule of the whole project.

What is especially demanding about interactive installation is its unpredictability. The system will also need to be designed so that it is durable enough to last under the constant strain of physical handling of the participants and the conditions of the display. Especially when working with wearable electronics the continuous stress put on the components by the physical activity of the engagement with a human body can easily cause malfunctions. This sets its own requirements for the construction and design of the costume.

5.4 Future developments

Because project *Symbiosis* is still a work in progress, we plan to continue working on the project and development of the concept. The goal for the future of the project would be to exhibit *Symbiosis* in an istallation setting so that the participants could enter the costume in a way that is presented in the short film. Because this was the first prototype of the concept I would like to create a second costume with the improvements that we noticed it needed during the process. For example, for the installation purpose the structure of the costume would need to be enhanced and the size upscaled to fit a variety of bodies.

In the case of *Symbiosis* the sound material used in the project was developed during the process. Therefore, it could be interesting to test how the costume design process would change if it was based on already existing sound material. Personally I find the visualisation of sound an interesting field of research and would like to test a practical implementation of the consept of designing a costume as a visual representation of sound.

In addition the interplay between the tactility of the costume and the intangibility of sound presents room for further research for costume design. In addition to thinking how the costume could visually represent sound it would be interesting to explore how the physicality of the costume could integrate the spatial and intangible properties present in sound.

For the next version of *Symbiosis* I would be interested in taking the thematic concept of mushrooms even futher by using fungi as biobased material for the costume. Combining the organic material with the wearable electronics could result in an interesting combinatio of two opposing elements.

In addition, it would be interesting to integrate to this next version biofeedback sensors which read the physiological imputs from the human body to the costume. This would deepen the physiological merging of the costume’s body to the human body. In the beginning of the project we thought about integrating a sensor that would read the persons heart rate and connect that to the LED. This way the pulsing of the LED could be synchronized with the rythm of the participants heartbeat. This would create a clear physical and physiological connection with the costume and the human body.

Personally I feel that there is a large range of possibilities exploring the topic of combining sound and costume can offer. This project has opened new ways for me to experience and work with costume with a collaborative and sensory focused approach. I hope to further explore the possibilities of this approach as i feel that there is still much to be discovered.

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