
TIRESIAS
ALIVE MACHINE

PORTFOLIO

Eleni
Xynogala

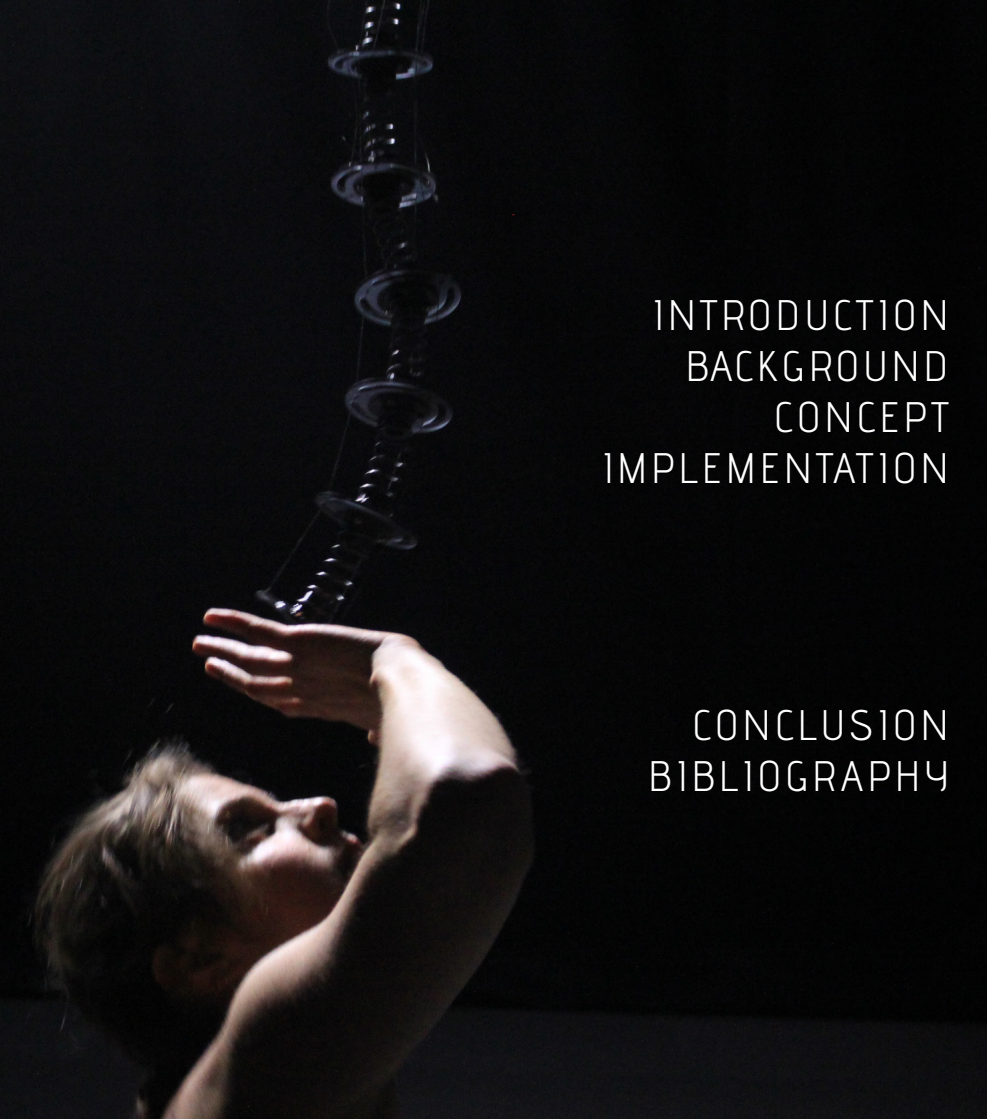
2017
2018

MA
INTERACTION DESIGN
COMMUNICATION

London College of Communication
University of the Arts London

IN COLLABORATION WITH

ROBOT DESIGNER	Vinzenz Reinhardt
CHOREOGRAPHER	Andre Kamienski - KAMIENSKI.
PERFORMER	Abigail Attard Montalto
CINEMATOGRAPHER	Carmen Pellon



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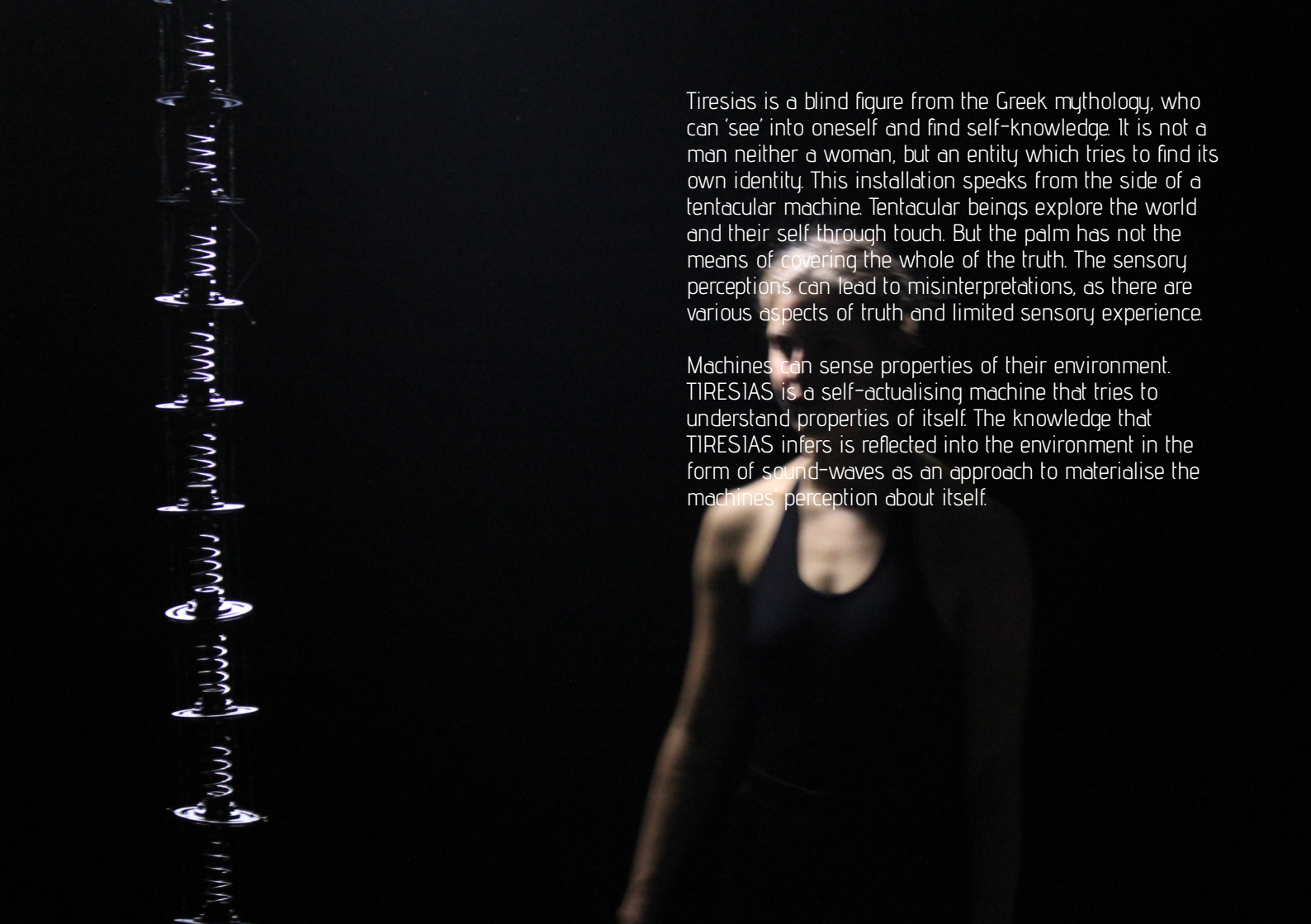
INTRODUCTION

"First, you build the machine, then it tells you what it's for."

-Catherynne M. Valente



Tiresias is a blind figure from the Greek mythology, who can 'see' into oneself and find self-knowledge. It is not a man neither a woman, but an entity which tries to find its own identity. This installation speaks from the side of a tentacular machine. Tentacular beings explore the world and their self through touch. But the palm has not the means of covering the whole of the truth. The sensory perceptions can lead to misinterpretations, as there are various aspects of truth and limited sensory experience.

Machines can sense properties of their environment. TIRESIAS is a self-actualising machine that tries to understand properties of itself. The knowledge that TIRESIAS infers is reflected into the environment in the form of sound-waves as an approach to materialise the machines' perception about itself.

An unusual duet co-performs for self-actualization through sensory experience. They explore the blurry lines between human and non-human, between the physical and the mechanical. The work is based on the blind prophet Tiresias, who creates his own identities, escaping the distinctions of man and woman.

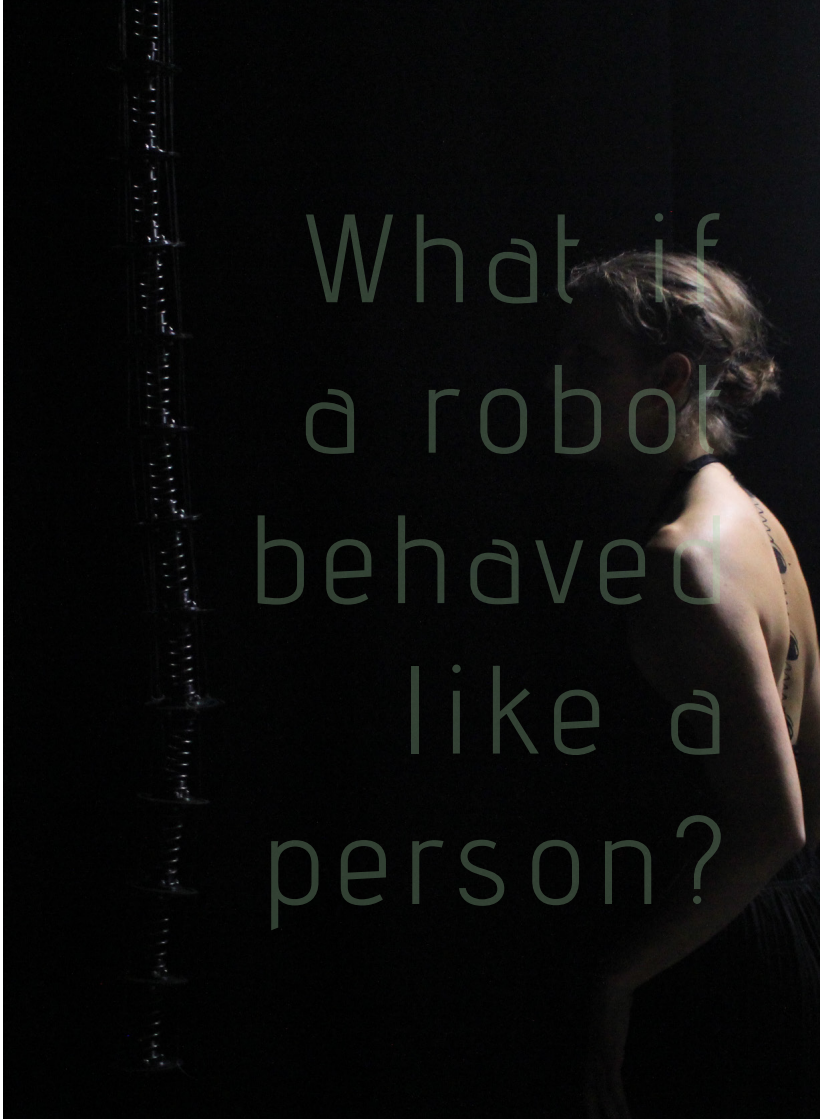
This portfolio is the documentation of the project called TIRESIAS, that developed for my final major project during my MA Interaction Design Communication at London College of Communication. Here you will find the process of work, which includes contextualization, research, inspiration, conceptualization, design prototyping and experimentation. My role as an interaction designer was the synthesis of different parts, such as the narrative, the machine making, the choreography, the sound, and the filming. This project developed after the research conducted in the parallel Critical Context Report, which was entitled *Alive Machines*.

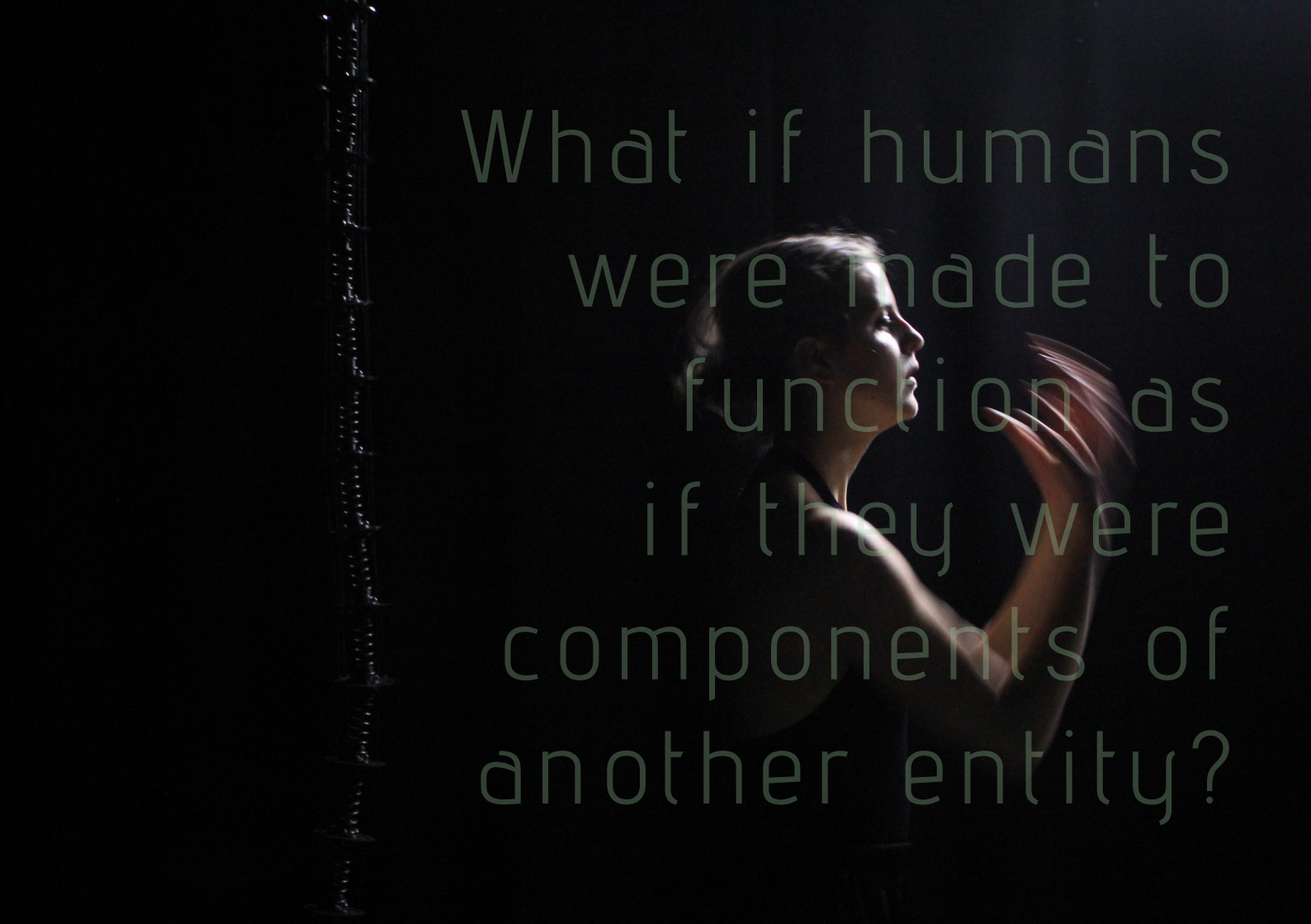
BACKGROUND

Located in theoretical ideas of cyborg and animism, the purpose of the research was to explore the ways in which we can avoid dualities of human and non-human entities and find new interesting relationships between different actors. Escaping the distinctions of human and machine, the cyborg creates its own identity.

In my practice, I am not looking at the robot as a tool but as a creative entity. Creative machines are capable to expand the script they are given by their human creator. Their movements are uncanny - human in motion, but inhuman in form. However, we have the tendency to impose creativity and attribute personality in machines because it is easier with this way to explain behaviour.

Nevertheless, it is important to acknowledge that all these sophisticated machines, are biased and result of human programming. But we can discuss further and design interesting connections and interactions with these convincingly 'alive' robots. Instead of looking at them as tools, we can try to face them as equal collaborators and see what new creative ideas we can develop with them.

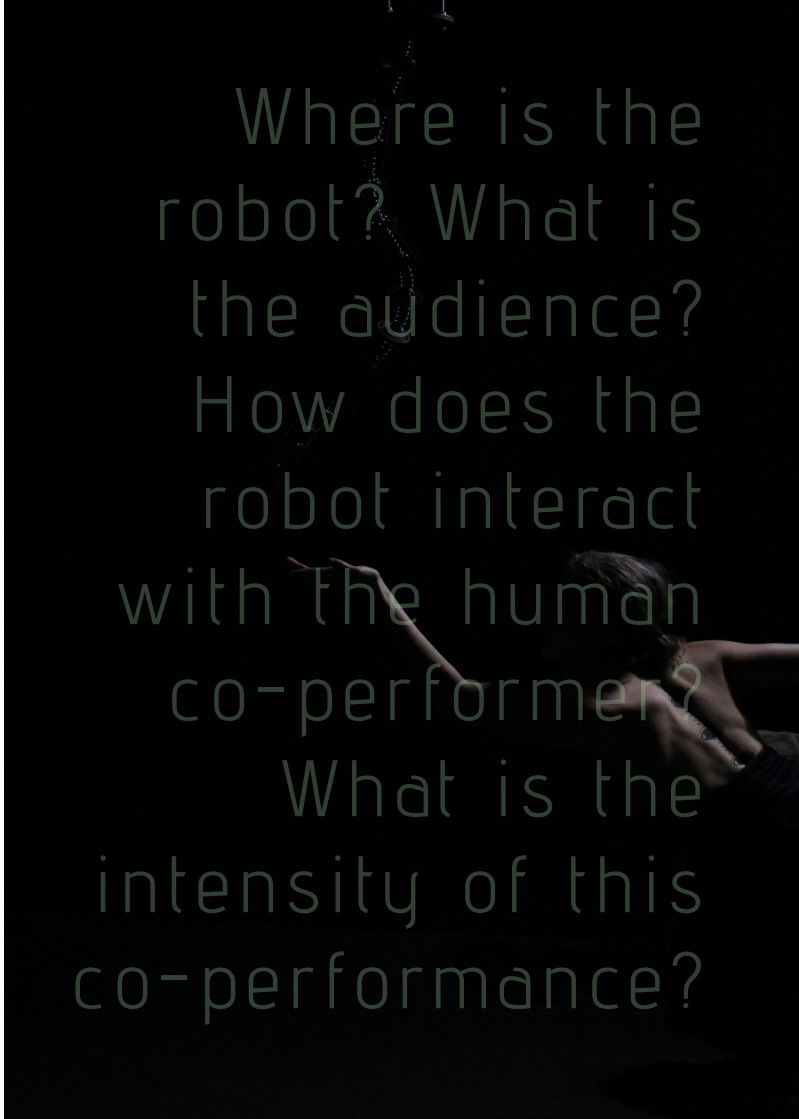


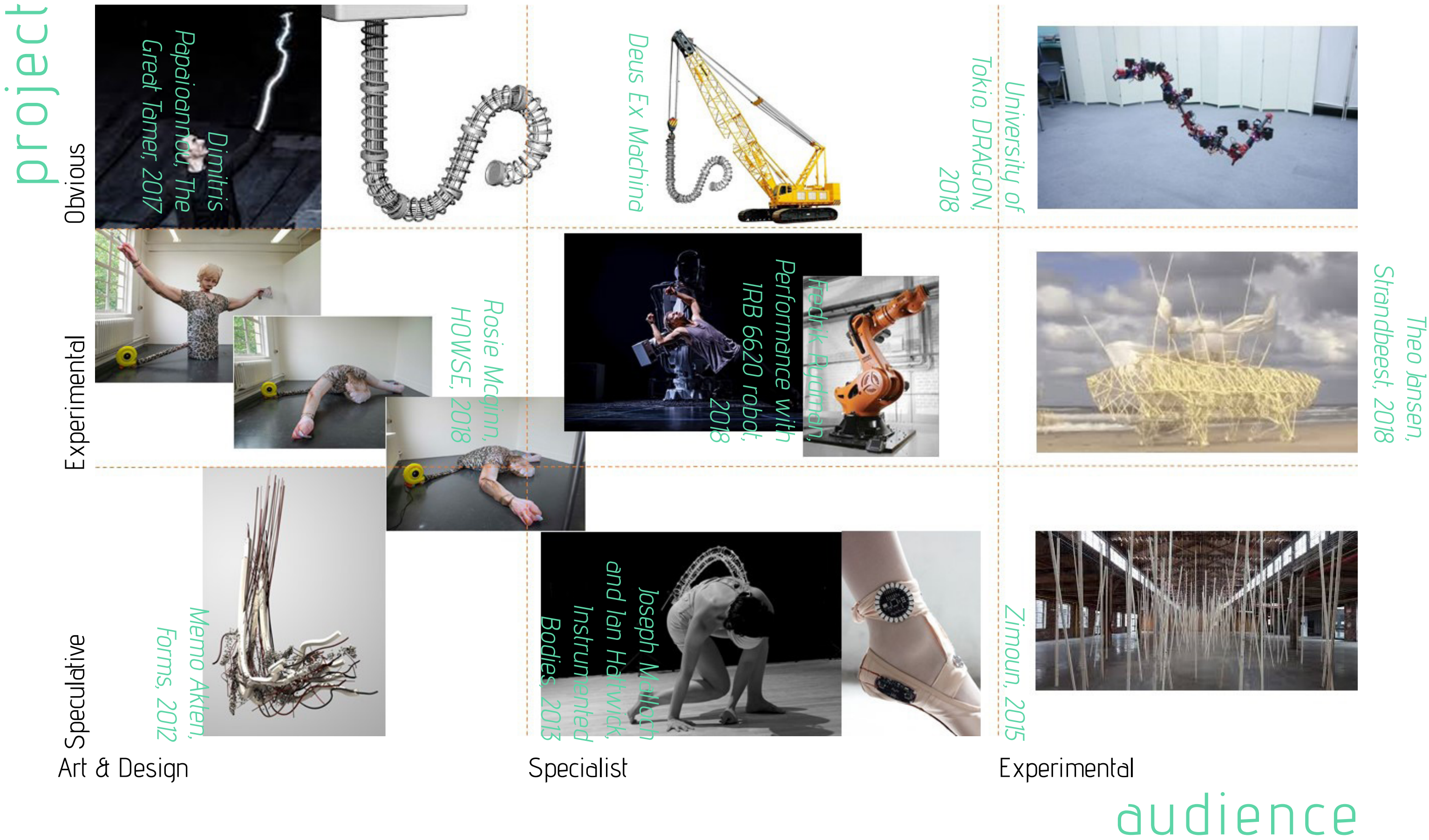

What if humans were made to function as if they were components of another entity?

CONCEPT

The concept started developing after our decision to create a continuum robot. This robot mechanism is inspired by nature, as it looks and moves like a snake, octopus tentacle or elephant's trunk. We created a physical structure, because of the superiority of the moving embodied robots, over computer programs. So, we first started designing the robot and then we allowed the robot to define what it wants to be.

During the concept exploration, I came across with the 3x3 gridded matrix, a methodology that comes from the University of Cambridge that allowed me to speculate on the different scales and possibilities of my project. The project could be something that is in my comfort zone and with mediums that I am familiar to use, but it could also be something more experimental or speculative. In terms of the audience, it could be made for the exhibition's audience, but also for field's experts or an imaginary weird audience. All these projects made me consider my context and the plurality of possible decisions for my narrative.



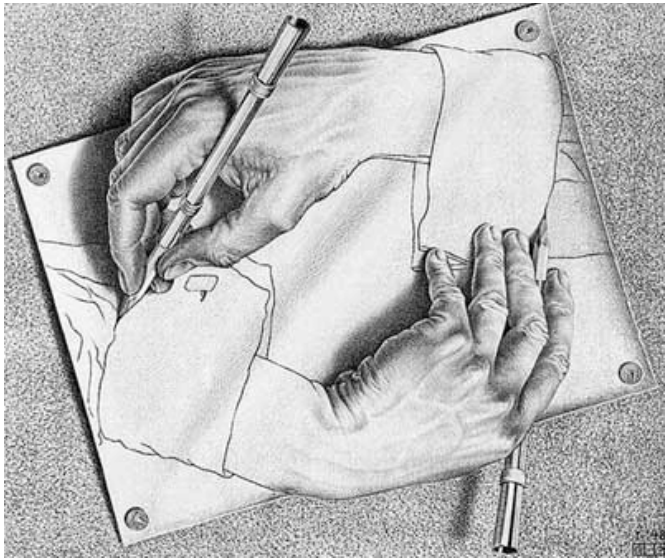

project
Obvious
Experimental
Speculative
Dimitris Papaioannou, The Great Tamer, 2017
Deus Ex Machina
University of Tokio, DRAGON, 2018
Rosie Mcginn, HOWSE, 2018
Fredrik Rydman, Performance with IRB 6620 robot, 2018
Theo Jansen, Strandbeest, 2018
Memo Akten, Forms, 2012
Joseph Malloch and Ian Hattwick, Instrumented Bodies, 2013
Zimoun, 2015
Art & Design
Specialist
Experimental
audience

The ideal decisions for my context would place the robot in a Greek ancient theatre. Hanging it from an old mechanism, like Deus Ex Machina - god from the machine, implying the idea that some people claim that technology will save humanity. In this way, I would like to allow the theatre audience to interact with the machine-god. For the human-machine interactions, I would like to use sensors that could recognize humans' gestures and motions, in order to interpret the idea of communication between them. In this way, the co-performers would act together and separate, improvising and synchronizing, making the audience to consider the machine agency and unpredictability.

However, our concept changed these context ideas and lead the robot in introspection and self-realization at an exhibition's place and audience. The final concept consists of three parts. The tentacular machine that tries to achieve self-perception, the limited sensory experience in exploring the truth and the creation of identities that escape the traditional distinctions of human and machines

Donna Haraway (2016) claims that "The tentacular are not disembodied figures; they are cnidarians, spiders, fingery beings like humans and raccoons". The tentacle is an entity that tries to feel through touch. Tentacular thinking inspired us for creating a tentacular machine that explores itself through touch.

This self-reference and self-consciousness are also called strange loop, which means that the machine finds itself back where it started..



M. C. Escher, Drawing Hands, 1948

The concept that we finaly developed is inspired by two different stories, an ancient Indian parable and a Greek myth.

The six blind men and the elephant

Once upon a time in India, there were six blind men. The men were curious about how an elephant looks like. So, the men went and found an elephant and started touching it. The first man touched the side of the elephant and said, "The elephant is solid as a wall". The second man that touched its trunk, supported that the elephant is like a giant snake. The third one touched its tusk and said: "It is sharp like a spear". The fourth man touched one leg and shouted, "What do we have here is a tree". The fifth man touched its ear and he came up with the conclusion that the elephant is like a huge fan. The last man, touched its tail, saying that "The elephant is nothing else but a rope". The men started arguing and wondering what the elephant is like. Finally, the men realised that each of them touched only a small part of the big animal and only if they put the parts together, they will see the truth.

Tiresias

One myth says that Tiresias came upon two copulating snakes and struck them with his stick. The goddess Hera was displeased by this action and cursed Tiresias by transforming him into a woman. Tiresias lived as a woman for seven years until she came across two copulating snakes and this time she did not strike them. This act had as a result that Tiresias was transformed back into a man.

The Indian ancient parable inspired our installation in terms of the limited sensory perception. The sensual eye is just like the palm of the hand. The palm has not the means of covering the whole of the beast. The sensory perceptions can lead to misinterpretations, as there are various aspects of truth and limited sensory experience. We called our robot TIRESIAS, inspired by the blind figure from the Greek mythology, that is looking for self-knowledge. It is not a man neither a woman, but an entity which tries to find its own identity.

Top: Hendrick Goltzius, Tiresias separates the snakes, 1590

Bottom: Johann Ulrich Kraus, The Metamorphoses of Ovid, 1690

IMPLEMENTATION

The machine

Vincent and Emily

Carolin Liebl in collaboration with Nikolas Schmid-Pfähler created two self-willed robots that communicate between them and with the environment. They communicate their thoughts and emotions through sounds and motions - controlled by their motors. They capture sounds and movements via sensors and react on those signals unpredictable.

This project interprets very successfully the concept of a human relationship, as the couple sends signals and seems like each partner answers to the other. The sounds, the human-like motions and the interaction with the audience give to the robots an inherent liveness. We were inspired by the elasticity of this mechanism, as the actions of the couple become at the same time smoother and unpredictable. We also liked the aesthetic choices of the project, to leave uncover the motors and the electronics, and as a result to achieve a non-anthropomorphic outcome.

Carolin Liebl, Vincent and Emily, 2013

However, our approach differs from this project in terms of materials, structures and interaction choices, because of the self- actualization concept and our vision for the robot to touch itself. Our robot needed to have a more flexible structure so as to be able to touch itself, but also to create more intense motions and spirals like dancing motions. Our concept didn't also require interaction with the audience, as the robot performs a self-perception narcissistic action.

Fearful Symmetry

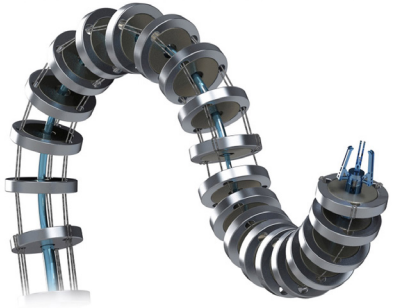
A mechanical machine in form that moves with soft, human-like motions, interacting with the audience's gestures and looking like a living organism. This project choreographed with the collaboration of a team of puppeteers giving the machine its uncannily human character. We had the opportunity to speak with the London-based artist Ruairi Glynn, who directs the Interactive Architecture Lab at the Bartlett School of Architecture, University College London. He advised us to build our concept in the idea of puppetry, where the object is manipulated from the machine puppeteer. We interpreted this technique, as we chose to mount all the mechanism at the top in the construction and handle the tentacle from the motors attaching them threads.

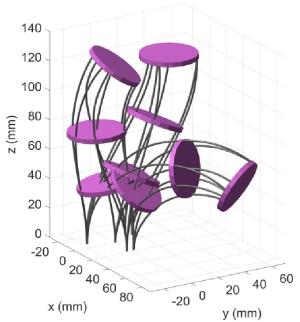
Ruari Glynn, Fearful Symmetry, 2012

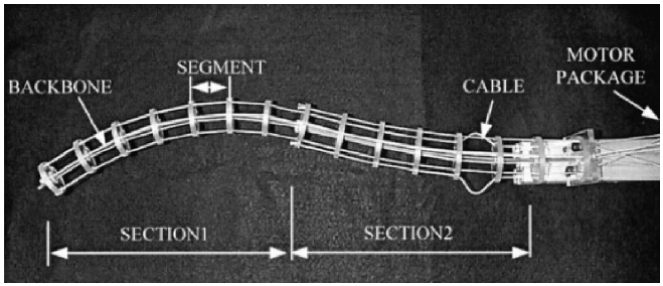
Ruari Glynn also proposed us to look at the twelve principles of animation so as to apply some of them in the robot's motion. For example, the principle of anticipation, iwn which when you go to move you first make an opposite movement, as when you go to jump, you first squash. In the same way, we try to make the robot move using some motions that are close to human kinetics. The gestural interaction with the audience is a feature that I would like to implement in the future for my concept of communication with the human co-performer.

Continuum Robots

The continuum robot is a flexible structure with a large number of degrees of freedom. Its construction is based on a segmented backbone (figure 5). Specifically, this structure consists of a backbone, and a serial connection of joints attached to the backbone, that create segments. Finally, the construction includes threads or cables connected to the joints, that are operated to move by motors and deform the backbone's shape.







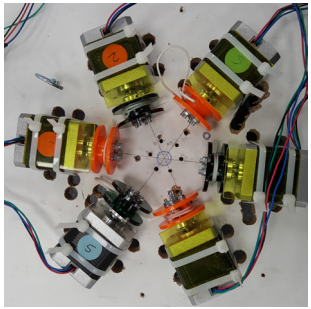
Clemson tentacle robot

This mechanism has been created by many practitioners, designers and engineers with different approaches. So, we tried through our research and experimentation with this tentacular logic to take the decisions that fit better with our concept and make the robot moves smoothly and with expanded motion range. The kinematics of this construction has a specific range of moments that we tried to expand it in order to allow the machine to touch itself. The existing continuum robots that we came across with don't cover the range of the motion that we tried to achieve, so we inspired by them, but we also tried through our experiments to contribute our interpretation to this mechanism.

Andrew L. Orekhov, Vincent A. Aloi, D. Caleb Rucker, The kinematic range of a continuum robot with two intermediate disks and 6 degrees of freedom, 2017

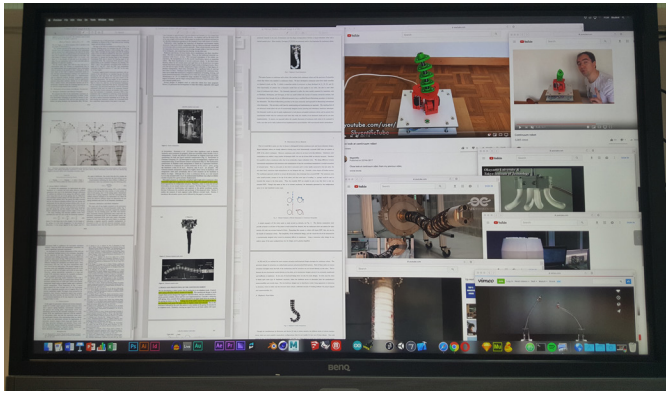
In the beginning, we started our first iteration with a metal thin compression spring for backbone, acrylic disks for joints and three nylon threads for cables. We tested how it works just using our hands to pull the cables and we really liked the motion. Reading some papers and watching some videos about different techniques and materials that we can use, we started experimenting. We specifically used different kinds of springs (compression, extension,) for the backbone, in different sizes and flexibilities. We also tried different acrylic and plastic joints, with the same size or in a pyramid structure. But also, other kinds of cables, such as nylon string and archery kevlar string.

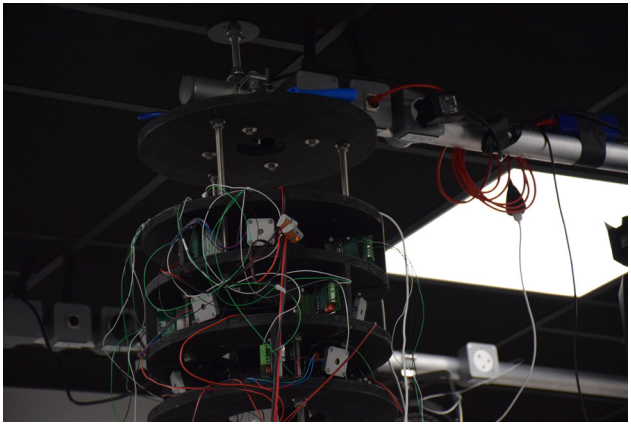
We also created a motor package using a wooden piece, where we attached the motors. In the beginning, we used three motors that each one actuated one cable that was actuated all the segments of the backbone. But later, making some research we experiment with a different approach. The paper Synthesis and analysis of a flexible elephant trunk robot (Yang et al., 2005) describes the creation of a continuum robot in which each cable actuates each trunk segment and each motor actuates one cable. This means that there is a high degree of manoeuvrability. This construction helped us to experiment with the technique of using different cables for different segments so as to have higher freedom and manoeuvrability, especially in the last segment, that tries to touch the parts in the higher backbone.



We tested different setups for the tentacle. It could be structured to stay either up or down or to the side. We kept it looking down because it was the easiest way to manipulate it. However, this brought other difficulties, such as the hanging of the construction, which demanded many regulations for the safety of the robot, the working process in a ladder and the health of the people that are around it.

During the experimentation, we came across with many difficulties, that we couldn't imagine from the beginning. For example, for the cable routing problem, we tried some different configurations, such as inside and outside of the backbone, or a crossing cable configuration (Case et al., 2017), such as the one described in Reducing Actuator Requirements in Continuum Robots Through Optimized Cable Routing. It was really difficult to handle the cables, as they had unpredictable behaviour, stacking in the motors sometimes. That's why we needed to create some spools to control their movements. Each motor has one spool that controls one cable in our construction. However, inspired by a robot interpretation (The Wandering Engineer, 2018) we also tried to connect in one motor two different spools, that create a crossing cable configuration. The result was interesting, but it wasn't helping to achieve the goal of the robot's touching each self.



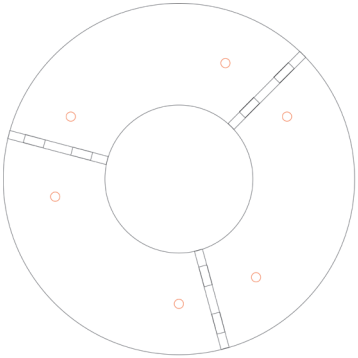


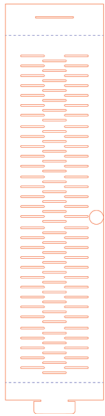
The final construction consists of 7 circular joined plywood disks, in which are attached 9 motors, 9 drivers, 2 power supplies and 1 Arduino, and a flexible tentacular construction of 14 segments, made of 14 circular compression springs, 27 plastic joints and 14 acrylic disks. There are 3 levels of motors and in each level, 3 motors are attached in plastic mounts that reduce the sounds of the motors and keep them stable. One thread is attached from the spool that is connected in each motor and it comes all the way through the construction, ending up to different segments of the tentacular structure. The size of the installation is 40x200x40cm and the weight is estimated about 15kg.

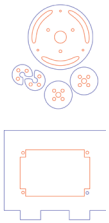
Vinzenz worked in the design of the construction in Cinema 4D, making a 3D model and the 3D printing parts, such as the spools' cover and, the joints between the springs and the disks. He programmed the robot's kinematics in Arduino for the prototyping phase, and he created a very useful communication between the Arduino and the Cinema 4D software, that it can help us in the future to control the physical model, having a very realistic digital model. He finally took care of a lot of the orders of different materials and electronic components that we used.

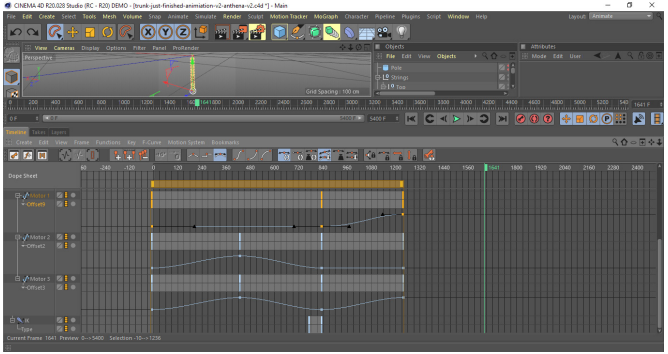
Both of us worked in the painting of the wooden parts and the composition of the whole structure. We faced many difficulties in the composition, as it was a very close structure that was difficult to intervene and change things. Also, the construction had many details that we did not take into account from the beginning and brought difficulties. As a result, we had to redesign some components or correct some of them which extended the construction timeline.

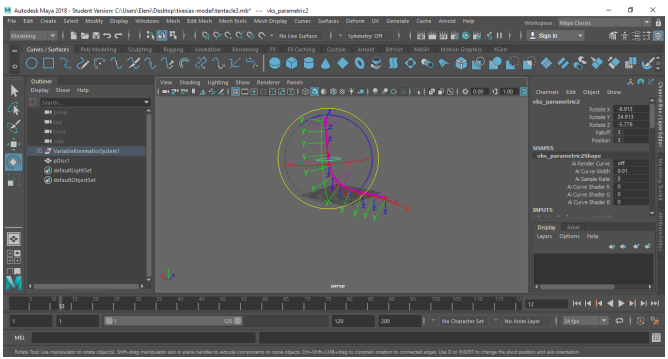
My role in the robot's construction was the design of the laser cutting components, such as the spools, the disks and the power supply covers, but also the design of the CPC cutting for the motor's base. I had many practical responsibilities during the compositions of the final structure, such as the attachment of the motors and the spools, and the threads' configuration. I also worked in the animation of the digital model that Vinzenz created in Cinema 4D and I experimented with some alternative digital approaches in Maya software. Unfortunately, we didn't succeed to interpret a very useful model for the kinematics that we wanted to operate, because our physical model had many material constraints and design complexities. So, I worked with the Arduino code to program the motions and the choreographic scenarios that I wanted to succeed. I tried to create different motions and movement durations and intensities, that could fit also with the dancer's choreography. This process was mainly based on observation of the robot's range of movements.











```
tinsias-debug

if(stageCounter == 14) // which Stage is it?
{
  if(stepper2.distanceToGo() == 0) // is the last motor done?
  {
    stageCounter++; // go to next Stage
    stepper7.setMaxSpeed(200);
    stepper2.setMaxSpeed(200);
    stepper9.setMaxSpeed(200);

    stepper7.moveTo(-600); // to which position?
    stepper2.moveTo(-600); // to which position?

    Serial.print("Stage: ");
    Serial.println(stageCounter);
  }
}
// !Stage
// Stage
if(stageCounter == 15) // which Stage is it?
{
  if(stepper2.distanceToGo() == 0) // is the last motor done?
  {
    stageCounter++; // go to next Stage
    stepper2.moveTo(-1000); // to which position?
    stepper9.moveTo(-600); // to which position?

    Serial.print("Stage: ");
    Serial.println(stageCounter);
```

Vinzenz's vision to achieve expanded motion range, so as the robot to touch itself didn't work. Probably, the weight and length of the construction are two negative factor for this motion, but also its flexibility creates a spiral motion that doesn't allow the motor to touch itself. We plan to experiment more with the structure of the robot, adding two motors that handle only the last segment of the tentacle – the tip, attaching the manipulating cables separately, in the outside of the tentacle, in order not to impact the other segments and not to be affected by them. After testing this idea manually, we found out that if the threads are independent of the rest of the construction, we will succeed our goal.

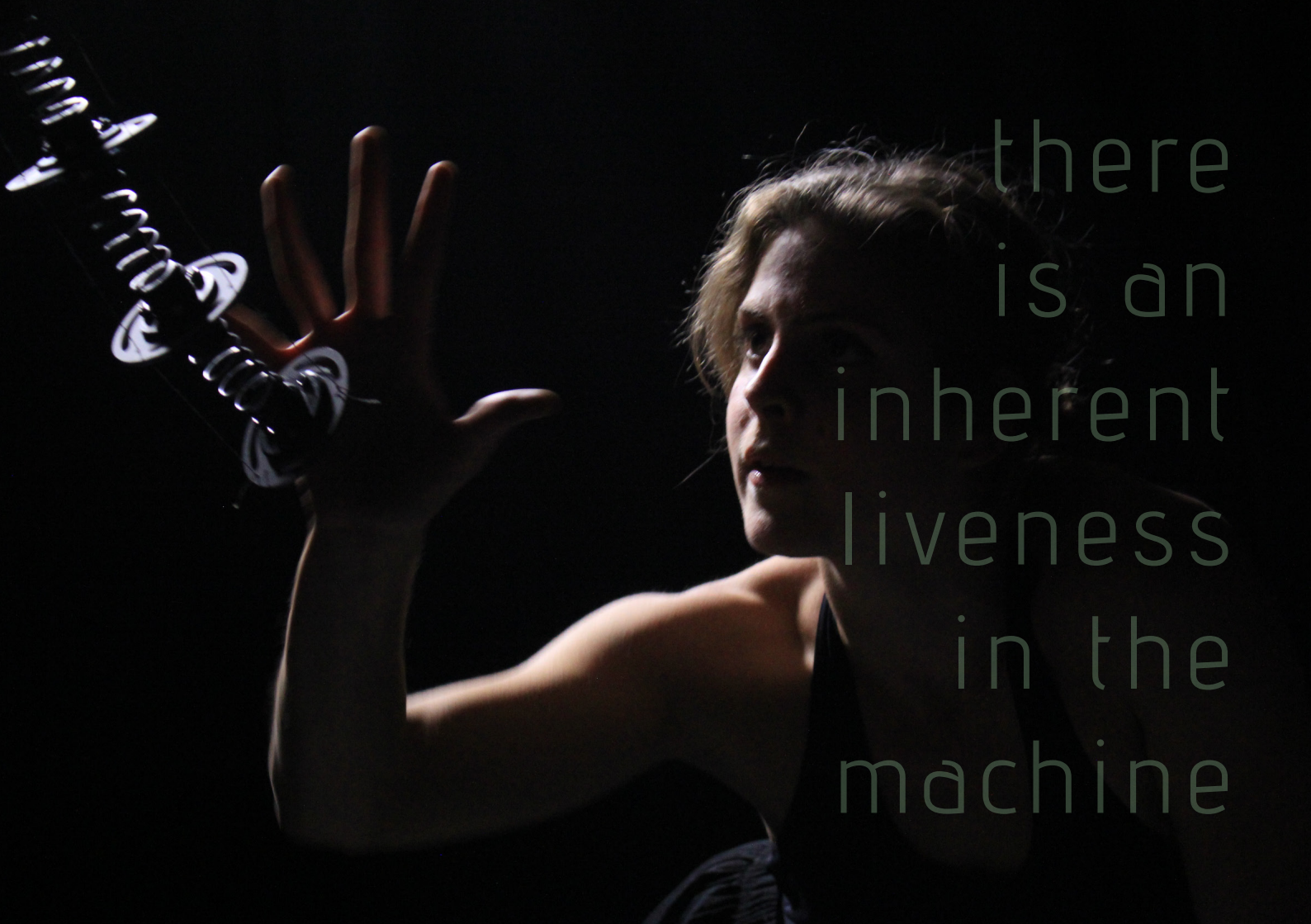
The sound

Robot's and human's sounds are used to create a soundscape. The robot creates its own sounds, that come from the way it operates, especially the sound of the motors that make it move. When the robot touches itself, it creates also sound that comes from the contact between the different materials that is constructed of. The human partner also contributes to this soundscape, through breathing sounds, which are connected with human emotional states. In this way, empathy grows between the dancer and the robot as they connect with the physiological experience of another. The human and machinery sounds are combined between them in order to create a new identity for the partners, without distinctions of human and non-human. Both partners become the source of weird sound that reveille this marriage between physical and computational.

We decided to use sound as a way to visualize the fact that it touches itself, but also the touching intensity. At the beginning, we regarded different sensors that we could use to show the touching data, such as colour, light flex sensor, and also different visualizations of these data, like colours, lights, graphics, but we ended up with sound because it is an embodied medium that contributes also in the narrative of an 'alive' machine that moves and as a result it creates sounds.

I had never before worked in sound, so I came in touch with some sound designers from LCC that helped me to record the different sounds that I needed for my concept with a Zoom Recorder in a quiet studio. I recorded different body sounds, such as my breathing, heart beating and finger knocks. I also recorded the robot's mechanical sounds of the motors' operation and its materials. Then I synthesized these sounds in Adobe Premiere, creating different soundtracks.

I started experimenting with MaxMsp and a contact microphone in order to manipulate the robot's sounds in real time. I attached the microphone at the end of the robot's tentacular structure. The microphone recorded sounds of the environment, adding to them some digital effects, like echo and delay. In this way, the robot selects and process properties of the environment. Every time it touches itself, it sounds like communicating verbally, playing randomly one of the tracks that I recorded. The sounds recorded also from MaxMsp and synthesized in Premiere for the video of the performance.

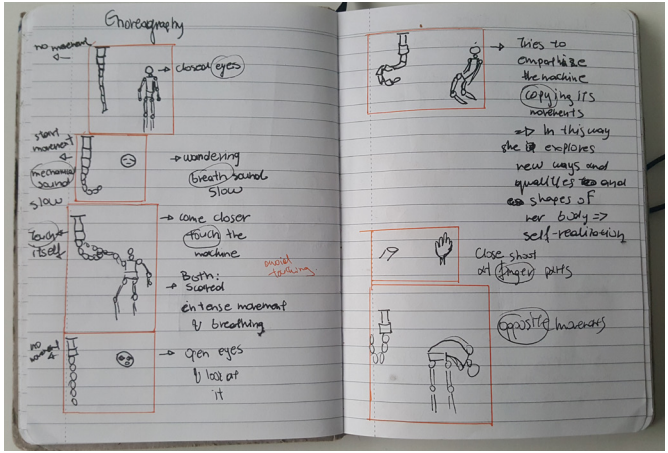

there
is an
inherent
liveness
in the
machine

The choreography

The goal of the choreography is to create questions of who has the agency and who follows whom. But also, to blur the distinctions between physical and mechanical, creating an interesting unusual duet of two bodies that are separate and united at the same time.

For the choreography, I collaborated with the choreographer Andre Kamienski from the dancing company KAMIENSKI. and the dancer Abigail Attard Montalto. In the beginning, I shared with them a lot of information about my research background and the concept that I wanted to achieve. Then I participated in the choreographic process, in terms of narrative instructions and storyboard.

Observing the robot's shapes, I tried to translate them in 2D graphics in order to use them with the choreographer and interpret them in dancing postures and movements. The robot that we created has a straight body that looks like a spine with a great range of flexibility. The human body consists of many parts that could be presented as straight lines. So, the human performer can interpret the shapes of the robot not only with the whole core but also with individual parts, such as the neck, one leg or one hand. The goal of the choreography was to create both similar movement patterns that are inspired by the robot motion, but also oppositions. In this way, the dancer can explore new ways and qualities of self-realization, and at the same time, the combination of the performer's kinetics can create interesting new shapes that we hadn't imagine before, or we couldn't create without a robot entity.



Valtari

Sigur Ros' opus Valtari, choreographed by Sidi Larbi Cherkaoui and directed by Christian Larson. In this film, we can watch the dialogue through movements and gestures between two human beings that move with a capturing animal way. Specifically, we see a male and female dancer copying each other's motions, before uniting to become one seamless entity of moving parts.

This film captures powerfully the passing through the stages of individuality and loneliness to dialogue and appreciation. Two bodies become one, respecting each other and trying to play their role in this gestural communication. We can also observe the scaling of tension, from neutral to passionate and to empathize with this metaphorical interaction.

Sigur Ros, Valtari, 2012

Seven Stages of Tension

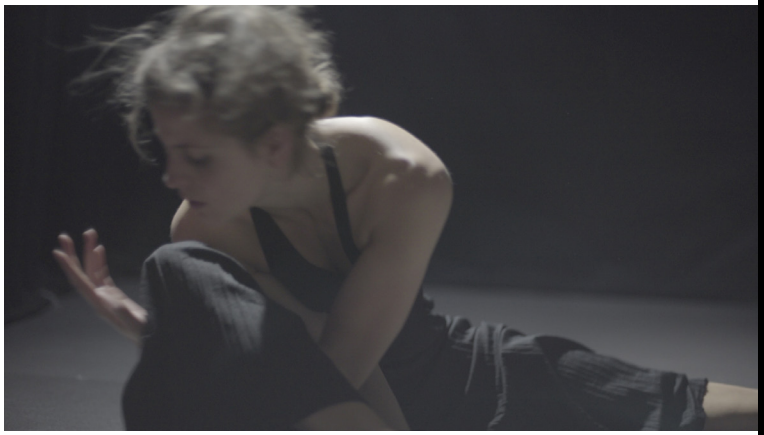
Jacques Lecoq developed an approach to acting using seven stages of tension (Farmer, 2015). Inspired by these levels of relaxation, I developed some of them for structuring the choreography. Then, I discussed these tensions with the choreographer, and we ended up with the following structure:

Neutral

The dancer begins in a state of full awareness, before everything changes. The audience watches a human being that expresses through contemporary dance and body gestures.

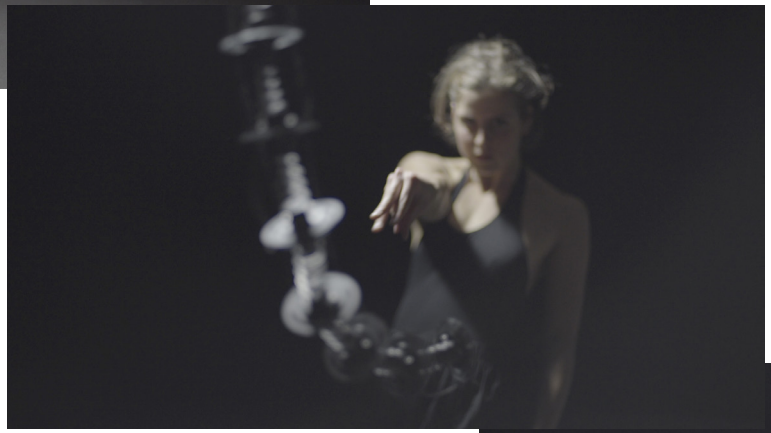
Alert

Suddenly, the dancer comes across with the machine. She starts to express curiosity about it, observing its kinetics.



Suspense

Dancer's body starts to react, in order to communicate with the machine. She tries to interpret some robot's postures, starting from small body's parts to the whole spine.



Passionate

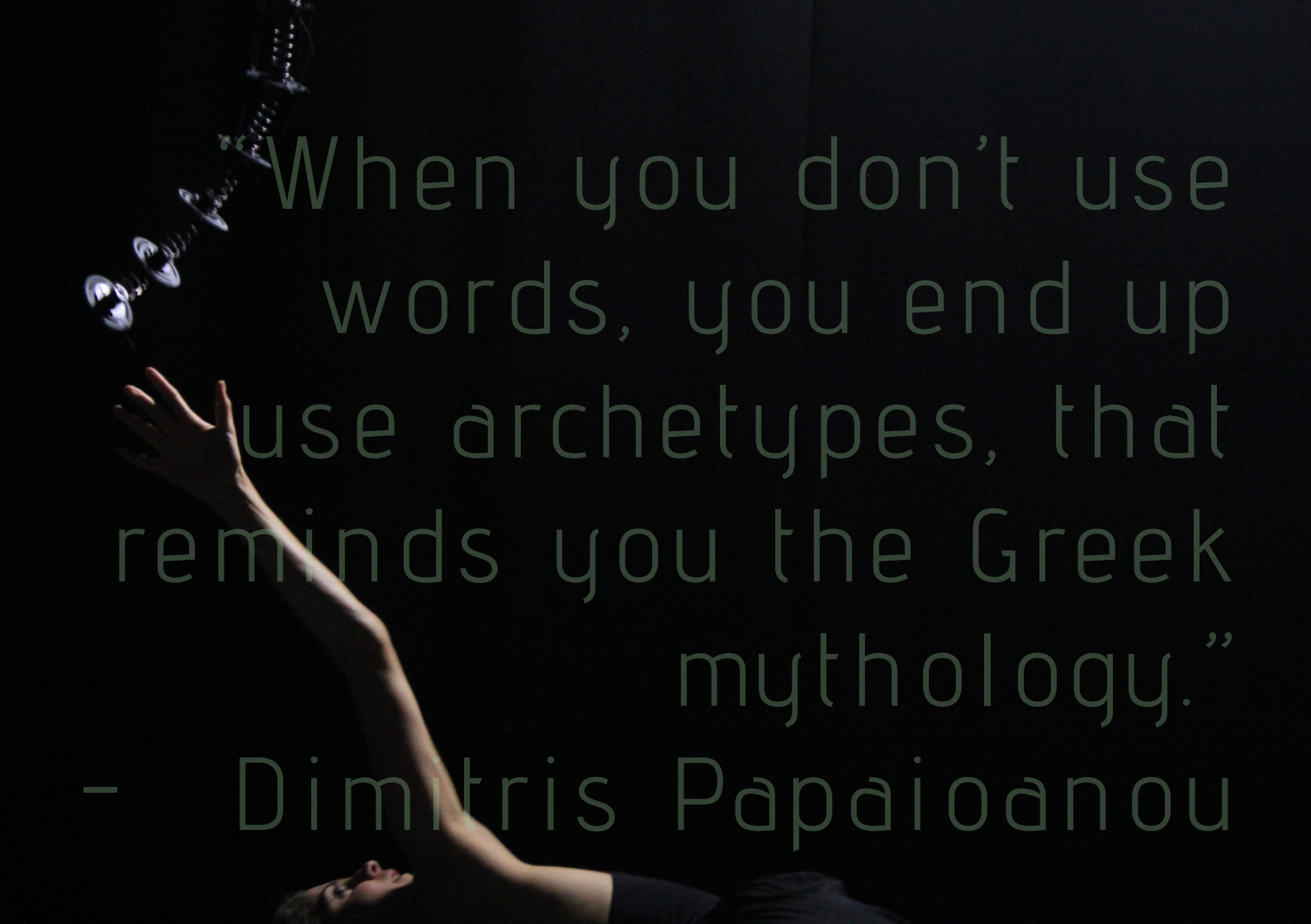
The tension has exploded out of the body and it's difficult to control. There is a blur line between the human and the machine. The robot is human in motion but inhuman in form. The dancer seems like a human being that is transforming into a robot, due to the kinetics that she copies from the machine.

Tragic

The body cannot move anymore, it is petrified. The dancer is also becoming like the blind Tiresias. She stops caring for the other entity. And she 'sees' inside her, wondering what her identity is and where the line is between human and machine.

The choreography started in a dancing studio. For Andre and Abigail was something new to collaborate with a robot. I tried to avoid the easy way of creating just a solo for one dancer. So, we agreed that the routine will be choreographically flexibly for change and improvisation. In the beginning, before they came in touch with the robot, we tried to explore ideas and postures of the robot's spirals that can be translated into human postures. They placed a scarf in the floor and tried to interpret with their body the shapes that it can take. It was a very creative process that helped a lot in the choreography.

After Andre created the initial choreographic skeleton, they came in touch with the robot. It was really shocking to watch this unusual partnership with the similarities in the motions and the oppositions in appearance. Even if the robot kinetics were choreographed, there were moments that the dancer and the viewers felt like the robot really sees the dancer and approaches her or mimic her. Abigail adapted her postures and their intention, trying to follow the robot's choreography.


“When you don’t use words, you end up use archetypes, that reminds you the Greek mythology.”
– Dimitris Papaioanou

The video

For the video shooting, I collaborated with Carmen Pellon and her assistant Marina Lewis. Before the shooting day, I met with Carmen so as to explain her the concept, show her the robot's and dancer's choreographies and plan the shooting. We agreed to the performance shot list, including wide or close static shots and some dynamic shots, but also the mood of the film and its visual style. Regarding the minimal and dark style that we chose for the film, we organized the technical equipment, that included a Sony A7s, Samyang prime lenses and white lighting from the ceiling. The day of the shooting we used a lot of light's diffusion filters to achieve the mood that we had designed.

In the video, I wanted to focus on the similarities of the dancer's and robot's spines, so I draw the dancer's spine, using a stencil technique with a sketch that was inspired by the robot's tentacular style. It was a very successful choice, as it helps the viewers to make the connection between the different organisms, and also helps the dancer to feel that a new characteristic becomes part of her body.

The shooting day was a self-realization of our work as we observed the behaviour of the people that helped us in the shooting. They knew that the robot is a mechanical construction, but they demonstrated that they feel that it is an alive entity, calling it 'him' or 'baby' and talking to it. This supported our animistic approach to attributing human behaviour in animate beings. Another factor of our work evaluation during the shooting day was the realization of the machine's disturbing character. It seems like struggling to move, and its construction makes noise, that creates a feeling of empathy, hiding a threatening narrative.

After the shooting, I edited a first edition of the video. The unusual duet was very inspiring for the cinematographer and for me so as to approach the ideas of oppositions and different organisms that melt and become one. Combining these images with the recorded sounds the result captures very successfully the creation of complex relations between organisms and the exploration of interesting identities.

Here you can see the first edition of the video:
https://vimeo.com/302664005

CONCLUSION

TIRESIAS is not a tool, but a creative entity that can stand next to a co-performer and defend the manifestations of choreographic thinking. We took the human's dancing qualities out of the body and put them into a machine, where it can manipulate in a way that the human had never danced before. In this way, the robot can inspire the human co-performer and vice-versa. This work is still work in progress that can be improved, having the potentiality of adding interesting interactive functionalities. However, it can be already evaluated as a successful interpretation that supports my research about Alive Machines through creative practice. The purpose of my research was to explore the ways in which we can avoid dualities of human and non-human entities and find the techniques to assign agency to the co-performers, creating embodied intelligence with complex interactions.

To do so, I created and choreographed a moving non-human entity that performed with a human dancer. In this co-creation, I added the sound that comes from physical and mechanical sources, so as to blur the lines between human and machine. The unusual duet co-performs for self-actualization through sensory experience. The robot explores the environment and itself through a microphone. The concept is based on the mythology about the blind prophet Tiresias, who creates his own identities, escaping the distinctions of man and woman.

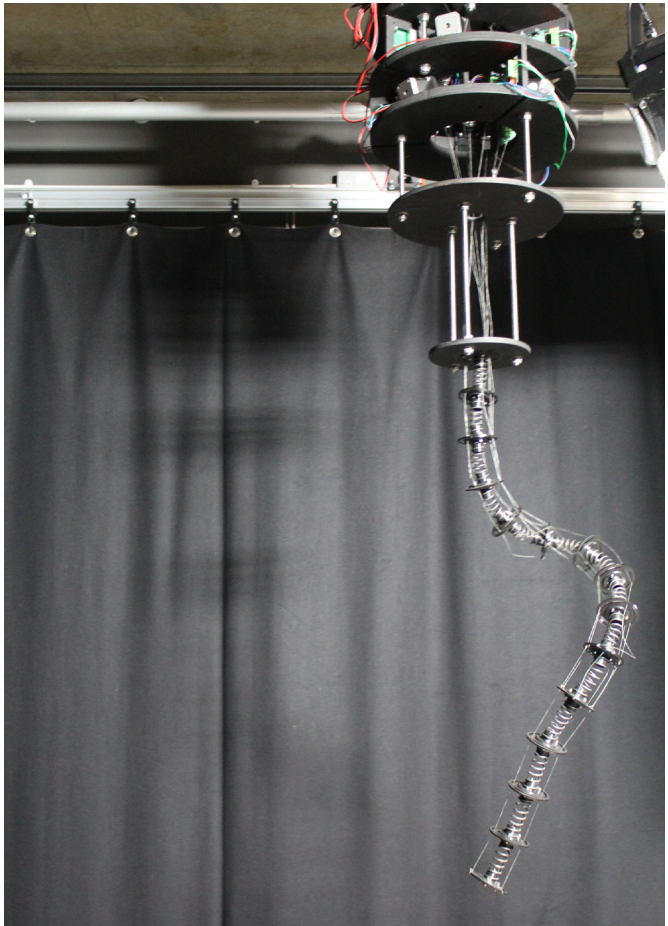
The outcome was a synthesis of many parts and came up from the collaboration of many people. The machine was made by the collaboration with Vinzenz, whose role was determinant in robot's design and development. We succeed to create a moving entity in a short period of time, experimenting with many approaches, building multiple prototypes and testing different animation practices. We faced many difficulties, and we had many failures during our experimentation, but we worked hard, learning new things, and helping each other to overcome the problems and find solutions or alternatives. The performance was made by the collaboration with the choreographer Andre and the dancer Abigail, that empathized and got inspired from our work, the concept and the planed storyboard, and interpreted the idea of TIRESIAS in an astonishing way. The video of the project filmed by Carmen, that has a professional background in cinematography and achieved to capture our work, adding a dynamic visual identity in the whole project.

Personally, I learned many new things in technical and analytical terms. I developed my skills in the design and

construction of the physical model, I experimented with animation software, I programmed a robotic choreography, I recorded and designed the sound and I edited the video. But probably, the most important was my role in the project management and the synthesis of all these different parts and people. I had to analyze the concept and communicate the storyboards of my ideas so as to have successful collaboration and achieve the desired outcome. I really enjoyed having this role, as I dealt with different circumstances, synthesizing the interaction between the different parts and people that put their expertise so as to achieve to make my project stronger.

The work evaluated, through the observation of people's interaction with the robot and the performance. People tended to attribute human characteristic to the robot and faced it as a living and threatening organism. The viewers were impressed by the way that a non-anthropomorphic entity moved natural and looked like having agency and develop an equal dynamic partnership with the dancer.

The work is going to be exhibited as an installation of the robot and the performance's video projected in the wall next to the robot. The interaction of the audience with the robot will give us valuable experience for improving our concept and the robot's functionality, in terms of giving it interactive and reactive behaviour. The most important is to bring discussion about the potentiality of a robot that looks alive and behaves like a dancer's co-performer that can expand the script and becomes creative.



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