

Mossterpeace

An Embodied Human-Plant Interaction Using Breath to Foster the Interdependent Nature-Culture Relationship

Marie Kaiser

K3 / School of Arts and Culture
Malmö University
211 19 Malmö, Sweden
marie_kaiser@web.de

ABSTRACT

This paper presents *Mossterpeace*, an interactive plant that sets out to increase the awareness of the mutually beneficial relationship between plants and humans and give comfort to those feeling lonely in a time of physical separation. Auditory and visual feedback triggered by the humidity of breath encourage a close interaction with the plant, that might have positive effects on mental well-being and plant growth, such as an understanding of the environmental contexts we are living in.

This embodied interaction design includes more-than-human bodies represented as plant bodies and concentrates on the visualization of plant communication to help express their needs towards a human understanding. In this article, the conceptual design and prototype is presented and discussed in terms of potential future developments.

CCS CONCEPTS

- Human-centered computing
- Interaction design
- Interaction design process and methods
- Contextual design

KEYWORDS

More-than-human design; Human-Plant Interaction; Embodied Interaction; plant bodies; breath; humidity

1 Introduction

The year 2020 has been overshadowed by one big topic: Covid-19 - a global pandemic that is transmitted through aerosols, and led to breath becoming a negatively connotated bodily function. During the summer months, the "Black Lives Matter" [2] movement became another big topic of discussion, initiated after the murder of George Floyd, a black man, committed by a white police officer. Floyd's last words "I can't breathe" became the tagline of the movement against systemic racism that was amongst other initiatives reflected on several social media channels through the #blacklivesmatter [4]. In times like these, where breath seems to be closely related to killing and death, the question, in which ways our

environment can still benefit from it, arises. However, the human breath still has a positive impact on our environment, for instance, giving life to plants. The nature around us benefits from the CO₂ of our breath. Plants need CO₂ just as much as humans need the oxygen they are producing in return. Thus, they both feed off of this symbiotic exchange.

Plant growth is more-over fostered through sound vibrations emitted by music and even human voices, for instance, when speaking [5]. Furthermore, scientific experiments uncovered the positive effect of human thoughts and intentions on plant growth [6].

At the same time, we as humans benefit from the contact with nature. Our mental health can be improved by talking about problems and taking care of plants. We are mostly only subconsciously aware of this mutually beneficial relationship that is present in every breath that we take. This discussion led to the initial idea to create a design that creates a benefit for both the human and the plant body, using breath as a tool to enhance the co-existence.

The individual can only exist in relation to the environment it is part of, lives in, experiences and which it interacts with [3]. Mutually, the environment, as we know it, exists only within our social contexts. With the increase of environmental challenges due to climate change, not only human lives but also non-human lives, such as plants' lives, are severely endangered.

Current design approaches are often based on a human-centered perspective whereas our social reality is interdependent with non-human beings. "Non-Human life forms, particularly plants and ecology are perceived as resources rather than a legitimate entity imbued with life" [1]. Plants can be perceived as singular or collective bodies in a similar way as human or other more-than-human bodies can. How might we raise awareness for the necessity to include a more-than-human perspective into design processes?

In our project group, we decided to design for an embodied human-plant interaction through touch and breath to visualize the impact we have on our environment and raise awareness of the fundamental

relationship between us and the nature we are surrounded with. In addition, this design addresses the opportunity to benefit from this co-existence in terms of our own mental health such as of the plant's well-being and growth by shaping a closer interaction between each other.

2 Design Approach

Based on Höök's "somaesthetic design" [3], we did not only integrate the symbiosis of body and mind in the creation of our design prototype but also into our practical iterative design process. We designed with and for our physical, mental and social bodies. Even more than that, we were interested to extend Höök's concept of soma design to plant bodies.

Desktop research was conducted on the ideal conditions for the individual plant's well-being, such as soil, moisture, environment, temperature, shape of the vessel they are planted in. Through the use of cultural probes, we intended to discover the preferred shape of vessel and plant for an interaction from the human's perspective.

Due to the ongoing Covid-19 pandemic, we also designed with and through distance as a pre-condition. One of our project group members is located in São Paulo, Brazil, which challenged us to create a design for distance. It led us to consider a connected network of human-plant interaction that fosters the global impact of the relationship between nature and culture as an iteration in our future work.

3 Conceptual Design Idea

The *Mossterpeace* sets out to foster a close embodied interaction, encouraging humans to speak to their plants - releasing humidity through breath and receiving an auditory and visual reaction in return. Adding vibration and light to enhance feedback from the plant that is usually only perceivable over a longer period of time, the design attempts to generate compassion and underline the sentiment of aliveness within the plant. With an anthropomorphic attempt to attribute human traits, such as conversational reactions and pauses through movement and sound created by the vibration motor, to the non-human plant body, we want to help humans understand the relation between their reality and the non-human reality [1].

The *Mossterpeace* is set up with its own individual characteristics that are influenced by the human interacting with it. The plant communicates its need for attention through different pulsating states of an LED light located in the plant's vessel base. By using light as an indicator for the plants needs, the inherent visual call for attention - usually the degeneration of leaves or dryness of soil - can be enhanced. At the start of the interaction, the light switches to an LED located within the plant vessel. This way, when the

human body (in this case using hands) and the plant (through its vessel) get into direct contact with each other, the connection can be perceived through visual feedback. Rustling of the plant's leaves is created through a vibration motor located close to the plant. The vibration is triggered when the humidity sensor that is placed between the leaves picks up a certain level of humidity through breath. The location of the sensors and actuators allow the user to focus on the desired area of interaction.

The human body in our project is, apart from its hands, represented by the aerosol cloud emitted from our breathing apparatus. By measuring the humidity of breath, the interaction becomes an embodied one in a sense that our breath can influence the behavior of the artifact. The more humidity is measured by the sensors located in the plant's vessel, the more vibrations and thus also auditory feedback is produced. The users are able to impact the behavior of the design, depending on the ways they interact with through the use of touch and breath. The plant body, in this stage of the design, is represented by the LED light and the vibration motor that translate the plant's need for affection and its response to it into signals that are better understandable for humans, leading to closer attention and a higher level of interaction.

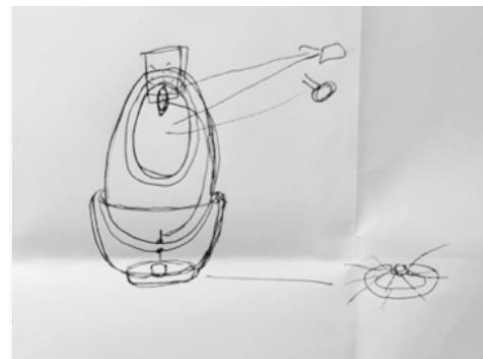


Figure 1: Design Concept Sketch.

4 Cultural Probes

During our research, we conducted a study using the cultural probes method. The decision to use cultural probes was based on our intention to aim for highly qualitative, creative outcomes in order to develop our design in potentially unexpected directions.

Therefore, we distributed little pots with plants and corresponding journals to 10 participants of different age groups, 5 of them living alone and 5 of them living in a shared household. The participants were able to choose between different terrariums. Each of them contained one type of moss and one type of another plant. We chose to include moss as a moisture-affinite plant to complement the humidity-based interaction through speech. The vessels varied in shape and size and differed by some of them having a lid or cover

and some of them being open. We were particularly interested in finding out what influence the shape, weight, size, texture and color of the vessel such as the type of plant could have on the nature of the interaction between humans and plants. Based on our assumptions throughout the first steps of the design process, we chose to work with small and portable vessels that have the benefit of the possibility of a closer embodied interaction which we were trying to aim for with our design.

Throughout the duration of four days, the participants were encouraged to have a conversation with their plant for approximately five minutes every day. They were asked to document their thoughts and emotions in the according plant journal (fig. 1). As emotion and movement are closely connected with each other [3], our approach was to include both of them equally in our design process and ideation. Within our cultural probes, we asked the participants about their feelings and physical points of interaction with the plant as well as how these singular factors were related to each other for them personally. During the probes, the participants were asked to illustrate their main areas of attention and interaction and their preferences on size, shape and material. One of the outcomes of the probes was that participants seemed to interact mostly with the leaves and the vessel of the plant. For once, the mouth area that would emit the highest humidity level, seemed to be close to the leaves during the interaction for the majority of the participants. The hands, for instance, would be used to interact with the vessel. These insights served as an important information for our decision on where to place the sensors and actuators. Specifically, we were interested in how the material impacts the user experience which helped us to develop our 3D prototype. Throughout this process, the plant's needs of specific vessel conditions became secondary.

Their immediate observations and emotions in the form of poetry, loose notes, drawings and diagrams allowed us to gain insights in the human perspective of the human-plant relationship.

One of the most common observations that the participants referred to as a feeling of "awkwardness" or a "weird feeling" when talking to their plant underlines the fact that the direct confrontation with more-than-human stakeholders in a design seems to be unusual.

Almost all participants felt most comfortable whispering to their plant or speaking to it with a low voice which effected our settings of the actuator triggering as whispering emits more humidity and affords for closeness.

The outcomes of our cultural probes impacted the design of our physical prototype such as the interaction attributes and artifact behavior.

We used the probes as part of our extension of some design to incorporate the discovery of the human-nonhuman relationship. We asked the participants to illustrate their ideal setup and how their relationship developed over time with the help of drawings and diagrams. However, these probes are only able to reflect the human perspective towards our design concept.

5 Physical Prototype and Artifact Behavior

With the insights that we gained throughout the design process and the cultural probes, we developed our prototype and its artifact behavior.

Our design concept intended to create an embodied interaction that is beneficial for mindfulness and mental health which is why we decided to include a clear plastic that makes the LED light in the base appear more soft. The color blue was chosen as it is supposed to have a calming effect.

In the resting state, when the plant in its vessel rests in its base, the light is softly pulsating. On the second day of no interaction between human and plant, the light starts pulsating stronger to indicate a change in the interdependent relationship. On the third day, the light starts to blink more visibly to make the user aware of the lack of interaction.



Figure 2: Cultural Probe Journals.

When the user picks up the plant in its vessel from its base, the LED light in the base turns off and a yellow LED light that is placed within the plant vessel turns on to indicate the active state of the interaction. The color yellow was chosen based on a human-centred color concept as it is connected with sunshine and friendliness. In a further iteration, the yellow color could be changed to a color that could foster plant growth such as specific infrared light.

As soon as the user talks to the plant and emits humidity, the sensor picks up on it and causes the yellow LED light to brighten up gradually according to the humidity level. The placement of the humidity

sensor that was initially supposed to be in the soil of the plant was shifted towards the leaves as we uncovered this to be the main point of interaction through our cultural probes. Once the peak humidity level has been reached, a vibration motor that is placed on the stems of the plant is triggered and causes the leaves of the plant to rustle.

6 Future Work

As the project was developed only over a relatively short amount of time, there are certain shortcomings that would need to be explored further in the future. As indicated in the Conceptual Design Idea section of this paper, the design with and over distance led us to think about a network of interlinked plants.

Plants, if one compares them to humans, have a much longer reaction span which was part of the reasoning behind some of the design decisions. Furthermore, this requires a testing phase of the prototype over a longer period of time to distinguish the long-term effect of the interaction design on the plants. Additional research on the effect of the sensors and their placement on the plant might be needed to reassure that they are not harming the plant's well-being. Even more than that, when having in mind that this design is supposed to address plant bodies, options for communication of the plant should be explored and included in the design. Those options could be related to the plant expressing their needs, i.e. regarding moisture or temperature. More-over, a possibility for movement of the vessel itself in its base in order to allow the plant to change its position based on its needs, for instance, lighting, could be a direction to pursue. Overall, making the plant's needs translatable and somehow more understandable for the human, i.e. by using RGB LEDs to indicate different movements or needs, could make the interaction a more beneficial one for the plant in return. At the same time, it could enhance the awareness for the aliveness of the surrounding nature for the user.

7 Conclusion

In this paper, the *Mossterpeace*, an interactive plant that aims to raise awareness for environmental relationships between humans and plants, was presented. It also sets out to create an emotional connection, transforming plants into confidants and companions preventing the feeling of loneliness during the need for physical separation. More research would be needed to examine if the design can actually contribute to the mental well-being of the users and especially on covering the needs of the plants.

As we co-exist in an environment with more-than-human bodies, such as plant bodies, the need to

include those bodies in our design process has been indicated. However, an equal consideration of both needs in the design is barely possible. Due to the lack of means of expression and independence of their actions, plants can't be included in the design process the same way as humans can. The design of the *Mossterpeace* is therefore still based on a human-centric perspective as we were not able to cover certain aspects from a plant's perspective. The current state of the design is more focused on the beneficial aspect of human-plant interaction on the human's mental health. At the same time, spending more time with the plant goes along with more affection towards the plant. By conducting further research, especially over time, we could try to use methods that make the plant's needs translatable and more understandable in order for us to better serve them.

8 Acknowledgements

Thanks to all of the participants of our cultural probes who contributed their time and insights to this project. This project was conducted in collaboration with Connie Oh, Naomi Strandberg, Rixt Baron and Vinicius Sueiro.

9 References

- [1] Bhardwaj, P.; Joseph, C.V. (2020): *Plantimate. Personality Augmentation for Fostering Empathy Towards Plants*. In: Companion Publication of the 2020 ACM Designing Interactive Systems Conference. Association for Computing Machinery. New York, NY, USA. 563–567. DOI: <https://doi.org/10.1145/3393914.3395901>
- [2] Black Lives Matter Website. URL: <https://blacklivesmatter.com/>
- [3] Höök, K. (2018): *Designing with the body. Somaesthetic interaction design*. MIT Press. Cambridge, MA, USA. 1-25, 29-35, 44-46, 49-52, 55-62.
- [4] Okri, B. (2020): *'I can't breathe'. Why George Floyd's words reverberate around the world*. In: The Guardian. URL: <https://www.theguardian.com/commentisfree/2020/jun/08/i-cant-breathe-george-floyds-words-reverberate-oppression>
- [5] Sharma, D; Gupta, U.; Fernandes, A.; Mankad, A.; Solanki, H.A. (2015): *The effect of music on physico-chemical parameters of selected plants*. In: Int. J. of Plant, Animal and Environmental Sciences.
- [6] Tompkins, P.; Bird, C. (1973): *The Secret Life of Plants*.
- [7] Van den Berg, A.E.; Hartig, T.; Staats, H. (2007): *Preference for nature in urbanized societies. Stress, restoration, and the pursuit of sustainability*. Journal of social issues. 63, 1. 79-96.

