# Anthrobotanical Investigations

*from the Studio*


*Daniel Slåttnes*

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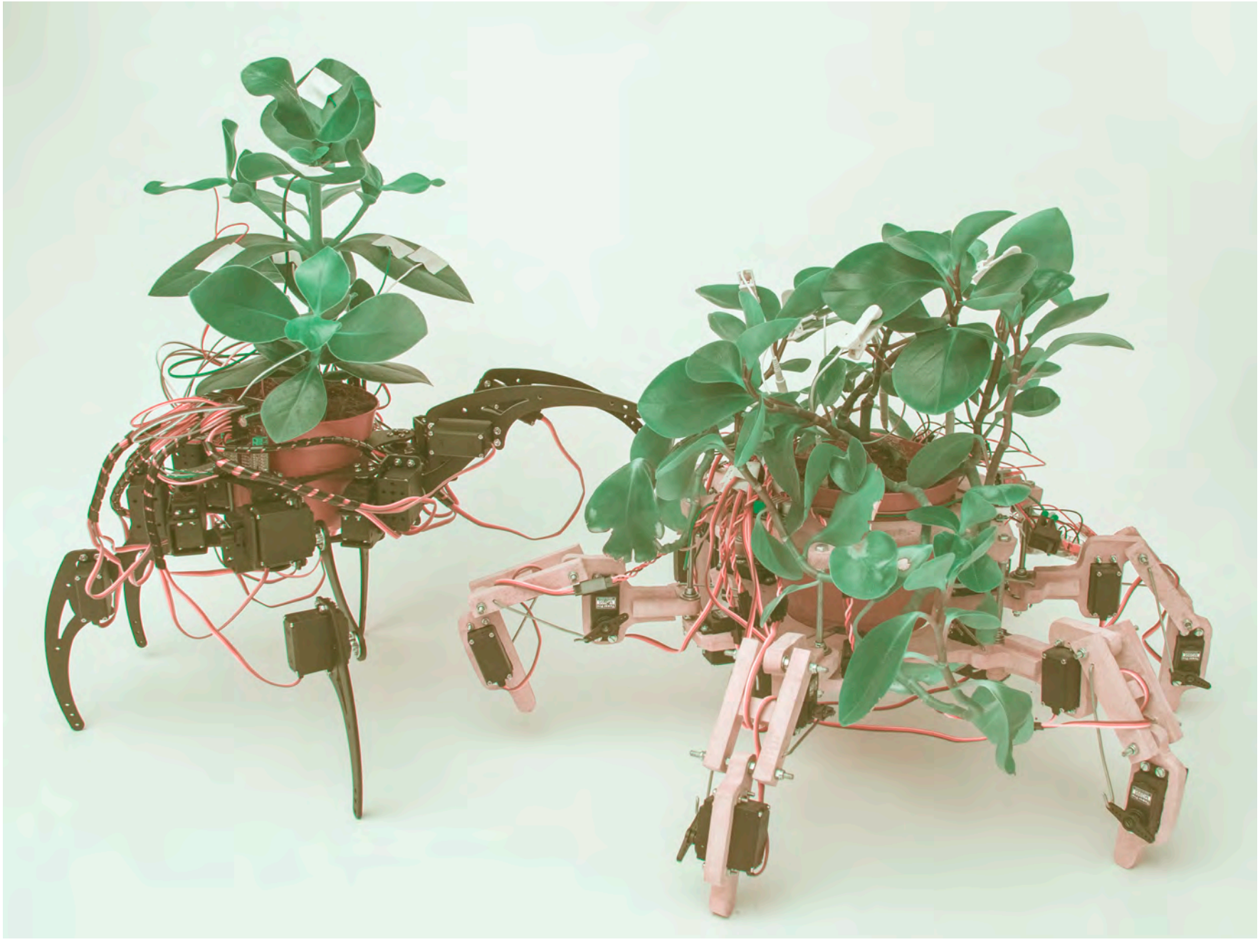
*Printed by RisooPrint*
*Graphic design by Kornelia Engqvist*
*Paper: Munken Lynx Rough 120g*
*Fall 2019*



# *Background*

*In 2015 I had the idea to try to make a sculpture in collaboration with a houseplant in my studio. It is a project that has had many twists and turns.*

*When I first started working with the plant we just sat together, sometimes for hours on end. My strategy, rather than to speak to the plant, was to find a form of bodily communication, simply to spend time with it and search for impulses from it. I tried to take in all the details, shapes, and nuances of the leaves and the rest of the plant's body. My thoughts quickly began to wander.*

*I tried to visualize the breathing of the plant. I felt the air course down through my own windpipe and back out my nostrils. I visualized the plant's inhaling the same air through the pores of its leaves. I imagined breathing through my skin, like the plant. I wanted to hold the plant.*

*I sat like that, meditating with the plant, hand in hand, until it gave me an inspiration. I made sculptures based on the impressions I received in these meetings with the plant. Together, the plant and I have produced several series of sculptures this way.*

*As the collaboration progressed, I gradually developed several techniques. I used an EEG machine (electroencephalography records the electrical activity of the brain) to transform my brain signals into sounds for the plant. It then only seemed natural for me also to listen to the electrical signals produced by the plant. I built an amplifier, which picked up the plant's signals and played them back as sounds, just like the EEG machine. I could listen to the plant's signals and the plant could feel the vibrations of my brain waves. I then thought that it would be easier to relate to the plant if it could also move, so I decided to make robotic legs, which the plant could control with its signals. These motorized legs functioned as prostheses that allowed the plant to exist in the same space-time as I.*

*I am now investigating the possibility to develop a choreography together with the plant. I envision a performative collaboration, which would cut across cultures and languages. Listening to each other's signals has helped advance this collaboration. The plant has already participated in exhibitions around Norway, Denmark and Sweden.*

*I am continuously interpreting the plant's movements. With the help of a researcher in electrophysiology, I have constructed a machine learning network that systematizes the plant's signals and analyzes them over time in order to learn its movement patterns. I believe that the more the plant and I communicate, the better we will get to know each other.*

*The network forms part of a computer program, which drew a chart of the plant signals, consisting of 14 red fields that illustrate its "mental" activity. The plant is like an individual with whom I am trying to establish a relationship.*

*What does it want? We cannot understand each other, we will never be able to share everything. But we can share our time together, our mutual relationship. We are constantly communicating with discreet signals. And through our shared contacts, these signals might begin to resonate. I am listening to the plant's signals while, in the background, I am playing the sounds of my brain waves for the plant. What are we saying to each other?*

*Meditation session with houseplants, December 2015*

# *What Is It Like to Be a Plant?*

*I am sitting in my studio, thinking about what it must be like to be a plant. It senses the world around it. Not as I do, but similarly in many ways. Both the plant and I notice when the sun rises and a new day begins. We both feel the warmth of the light. I recently read a study that described how meadow flowers begin to produce nectar when they hear the sounds of bees nearby.[1] If I focus on our similarities rather than our differences, it is not difficult to find connections with the plant.*

*I meditate in order to experience being a plant. Based on what I know about plant biology, I imagine breathing with my entire body. I try to connect sensations on my skin to the sensation of breathing. I imagine being immobile. But when I meditate, my thoughts begin to wander. I find it difficult to believe that the plant has thoughts that wander, but perhaps in its own way it daydreams. Maybe it looks around, senses what is going on underground and feels the wind against its leaves.*

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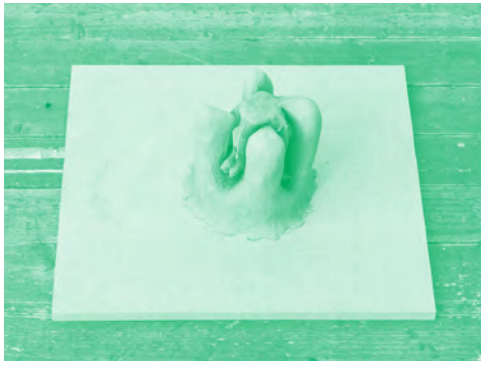
*1 Flowers respond to pollinator sound within minutes by increasing nectar sugar concentration.*
*Marine Veits, Itzhak Khait, Uri Obolski, Eyal Zinger, Arjan Boonman, Aya Goldshtein, Kfir Saban, Udi Ben-Dor, Paz Estlein, Areej Kabat, Dor Peretz, Ittai Ratzersdorfer, Slava Krylov, Daniel Chamovitz, Yuval Sapir, Yossi Yovel, Lilach Hadany*
*bioRxiv 507319; doi: https://doi.org/10.1101/507319*

# *Collaborations with the House Plant*

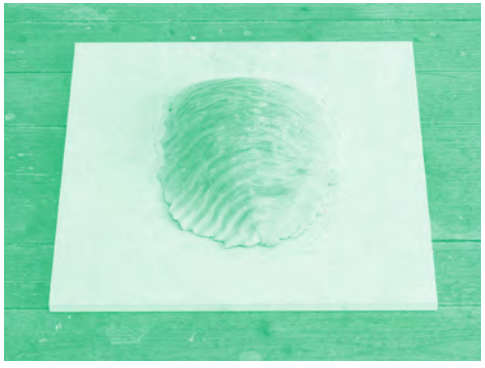
*As part my project to collaborate artistically with a houseplant, I also produced sculptures on behalf of myself and the plant. This process consisted in regular meditation sessions in which we both listened to each other's biosignals through amplification.*

*Influenced by the plant, both on a bodily and on an auditory plane, I intuitively produced sculptures on our behalf. I see this as an intuitive form of listening to the plant's guidance.*

*Collaboration #6*



*Collaboration #7*



*Collaboration #8*

*Collaboration #9*

*The National Art Exhibition, Oslo 2017;*
*Unfired clay 40cm x 40cm x 25cm (length x width x height)*
*Plaster 20cm x 20cm x 45cm*
*Styrofoam 100cm x 60cm x 40cm*
*Air-dry clay 20cm x 20cm x 6cm*

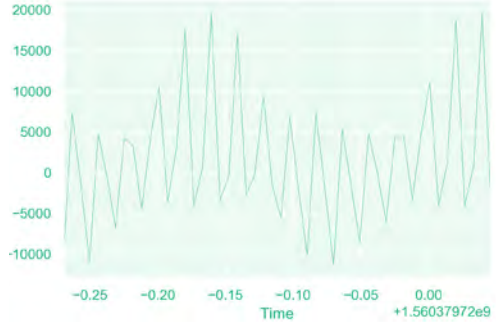
*Collaboration #2*

*Collaboration #3*

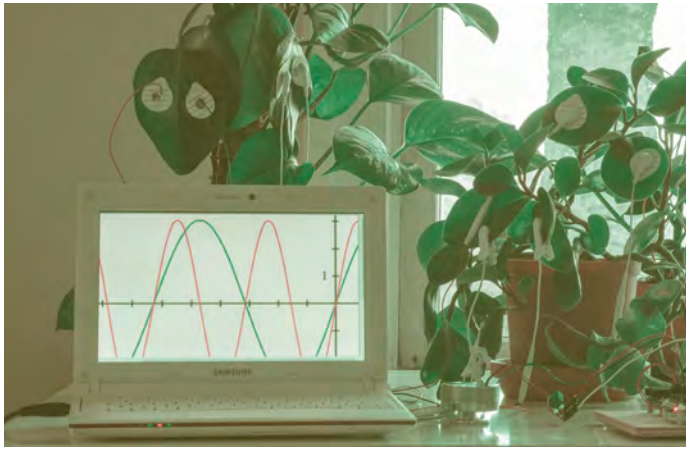
*Collaboration #1*

# *Analysis*

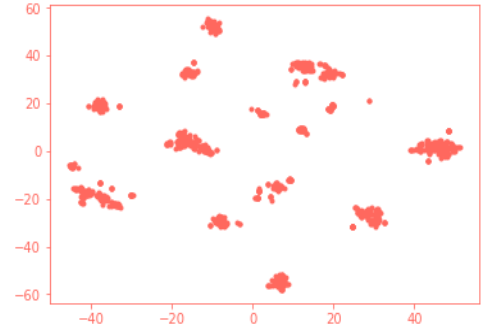
*I worked with six Peperomia obtusifolia of different cultivars. This common houseplant is also known as baby rubberplant or pepper face. At the outset, it was sheer coincidence that I had already chosen this type of plant to keep me company in the studio. But as I experimented with various other plants it became clear that the leaves of the Peperomia were better suited for attaching the electrodes. The electrodes I use are ordinary surface electrodes designed to measure heart rhythm. The electrical signals of plants are responses to changes in the environment (for example watering, lighting, temperature) and to stress (for example drought, disease, damage.)*




*Signal response to watering*

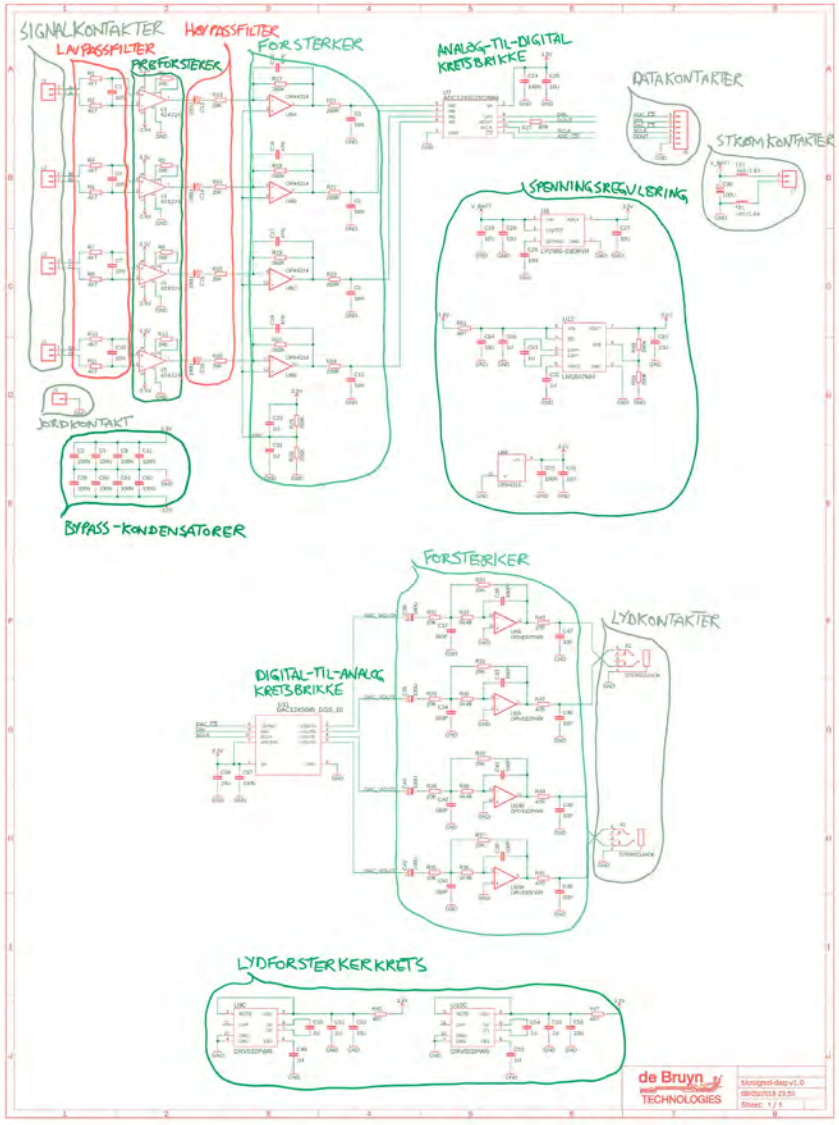


*Placing electrodes*




*Cluster graph*

*Circuit diagram: Amplifier for biosignals with analog-to-digital converter*




*The amplifier used to pick up biosignals from the houseplants was developed with the help of engineer Dewald de Bruyn. The circuit is open-source and can be found at: https://github.com/slaattnes/Biosignal-DAQ*

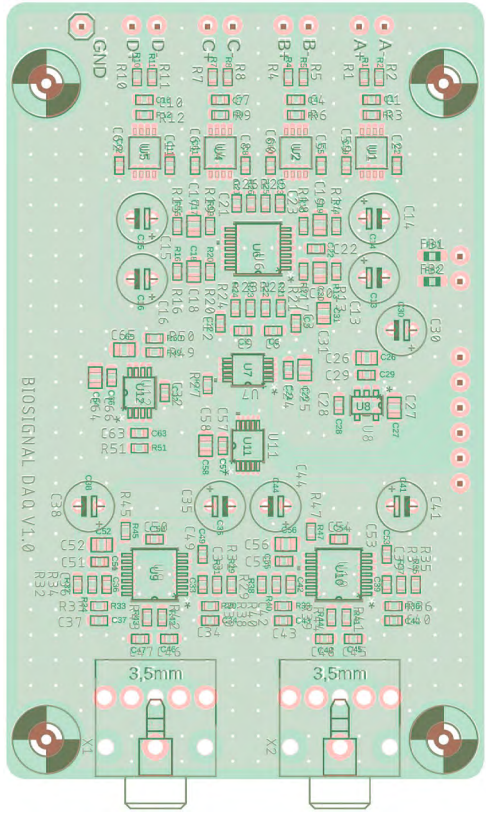


# *Practice with the Robotic Prosthesis*

*The program that communicates between the plant and the motorized legs comprises an artificial neural network known as a convolutional autoencoder, which scans the plant signals like an image in order to extract parts of their content.*

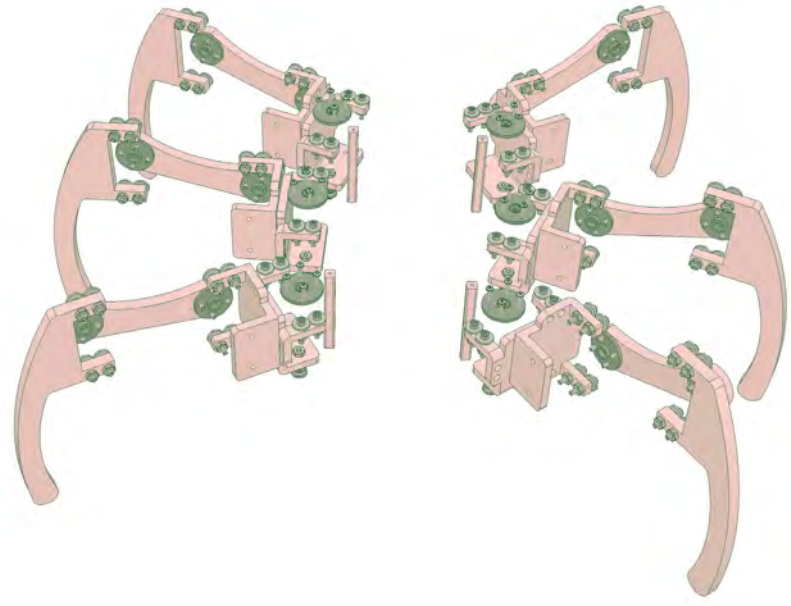
*The network has learned to recognize plant signals with artificial sunlight from four different angles by producing signal imagery similar to EEG graphs. The network then compares real-time signals to this signal imagery and moves the legs in the most appropriate direction.*

*The robotic prosthesis consists of a small computer (Raspberry Pi), motor controls, battery controls, signal collection and amplification circuits, and a 77Wh Li-ion battery.*




*Circuit diagram: Amplifier for biosignals with analog-to-digital converter*





*The motorized prosthesis of the houseplant is based on aluminum parts that can be bought from popular Chinese online stores. The design is comprised of hip, thigh, and shank parts separated by joints. Building instructions can be found at: https://www.instructables.com/id/Capers-II-a-Hexapod-Robot*

# *Afterword*

*I would like to thank everyone for their attention. To me, working with art is paying attention to something. Something that with enough concentration and reflection might become a thing on its own. Art is like a feeling one has never had, or perhaps an idea, an experience one cannot fully grasp. But art does not exist without the attention of the spectator.*

*Working with a houseplant was challenging; my only guiding principle was persistence. It was not always easy to believe in myself, but I always believed in the project. My main focus is always to learn more about the art project itself. I hope that the reader has also found it interesting to learn more about this project.*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GND
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