MONA SAFARI 2024

SYMBIONT

SOFT-ROBOTIC OBJECTS
FOR TACTILE COMMUNICATION

MASTER OF DESIGN - DIGITAL FUTURES

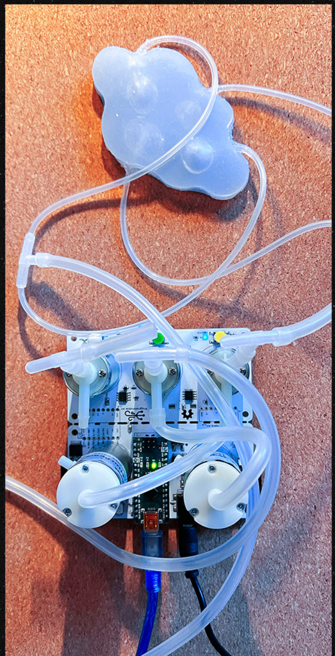
Symbiont refers to a soft robotic object designed for facilitating interpersonal communication through tactile means. Developed through many iterations, this biomorphic soft object enables individuals to explore different tactile sensations and communicate via tactile signals. While this communication style may not transmit specific messages as verbal interactions do, it creates a distinct layer of interaction. The design aims to captivate and engage users with its sensory elements, such as texture, biomorphic shapes, and metaphorical significance. Symbiont is intended to offer a consistent experience, allowing everyone to interact with, communicate through, and experience Symbiont in a myriad of ways.

Each **sensor**, when activated, **triggers** a **corresponding actuator** on another Symbiont, facilitating a silent, tactile conversation between participants. The tactile signals are imbued with **metaphorical meanings**—such as a beating heart, the sensation of touch, and the feeling of being touched—derived from research into human interactions and connectivity with the surrounding world.

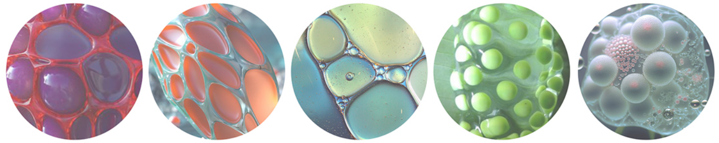
RESEARCH PROTOTYPE DESIGN DEVELOPMENT

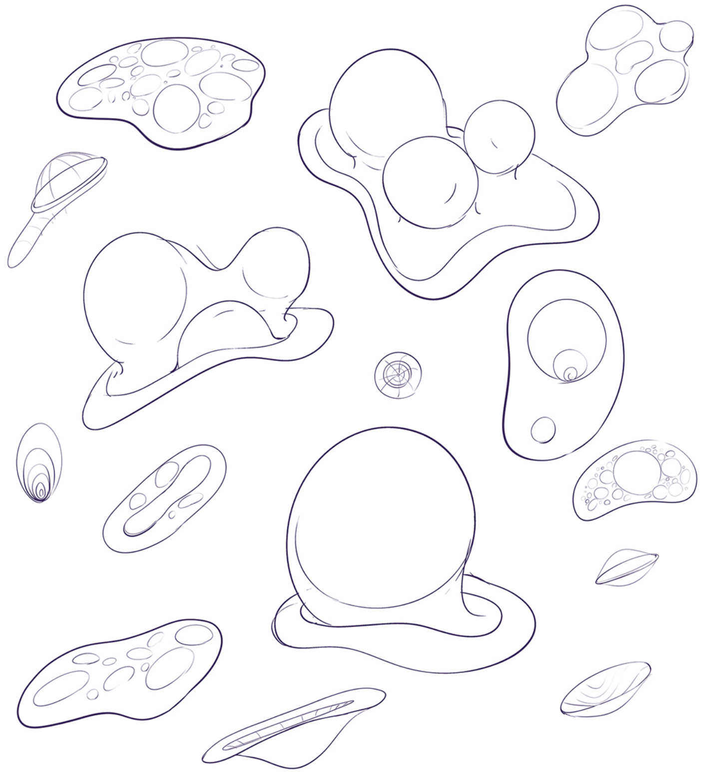
PROTOTYPE I

HELLO WORLD



This prototype concentrated on the development of soft actuators through mold-making and silicone casting. Additionally, it provided valuable knowledge and experience in pneumatic systems and soft robotics foundations.

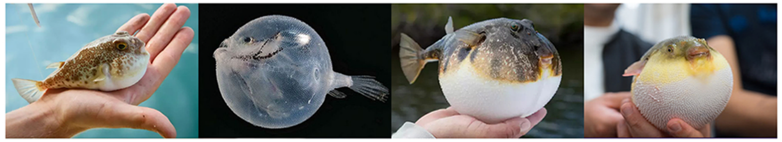


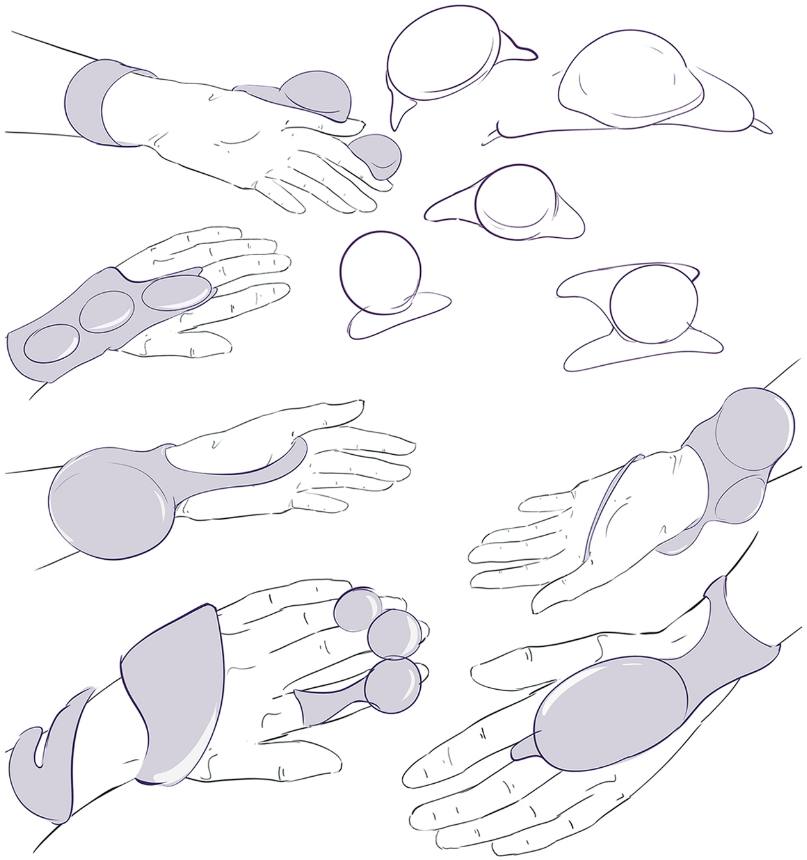


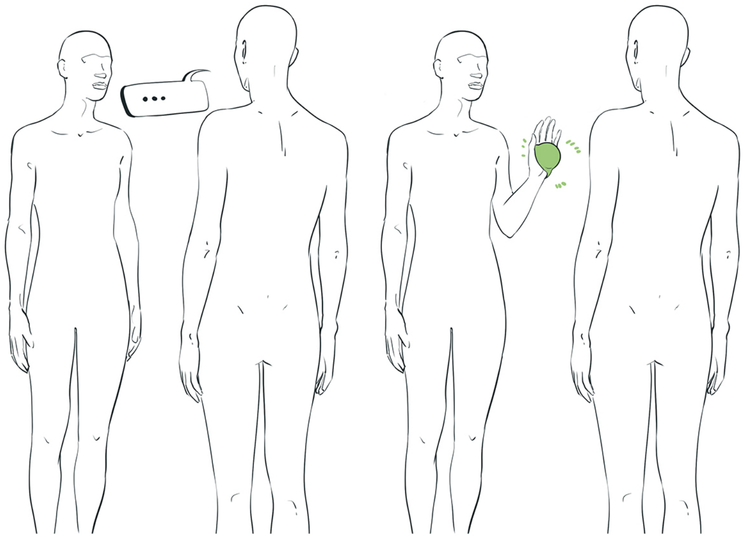
PROTOTYPE II

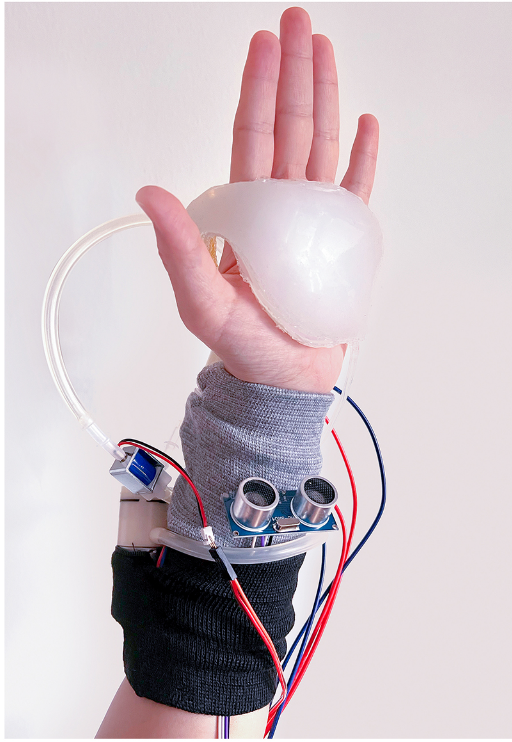
HiPALM

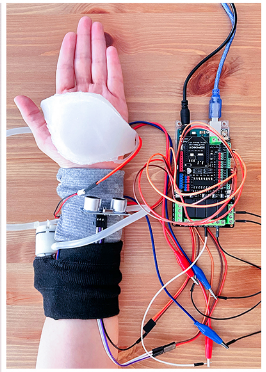
Developed during the Covid-19 pandemic in response to the decline in physical interactions like handshakes, HiPalm is a wearable soft robot that facilitates nonverbal communication.







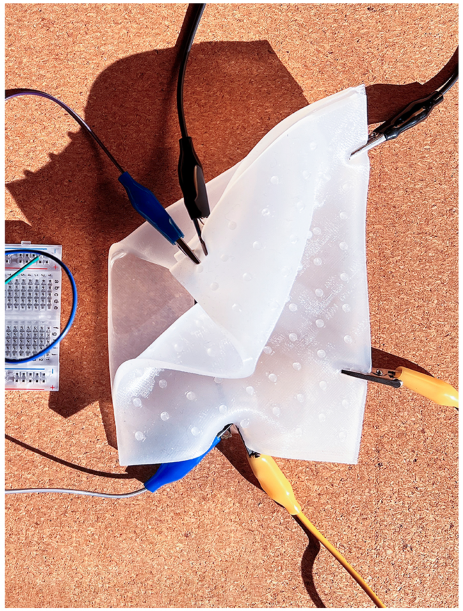




HiPalm inflates or deflates based on the proximity of another person's hand; it inflates to signal "Hi" without direct contact, then deflates to allow for a handshake with a barrier, avoiding direct touch while retaining an organic feel due to its material's properties. This prototype aimed to explore the interplay between human tactile sensations and perception when interacting with soft, lifelike materials, guiding further investigation into how these elements influence interpersonal communication.

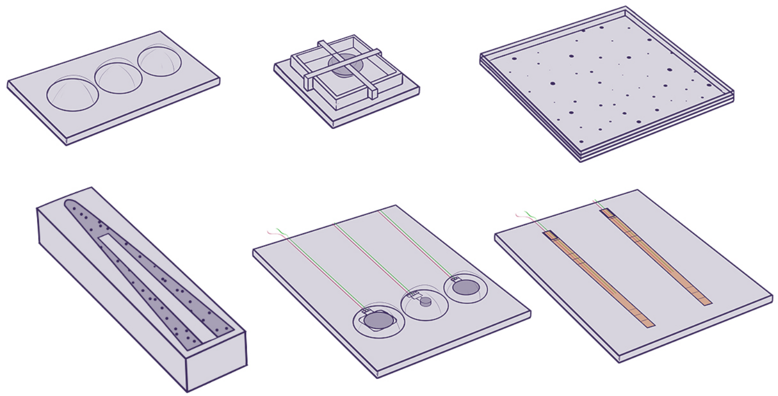
PROTOTYPE III

EMOLINK



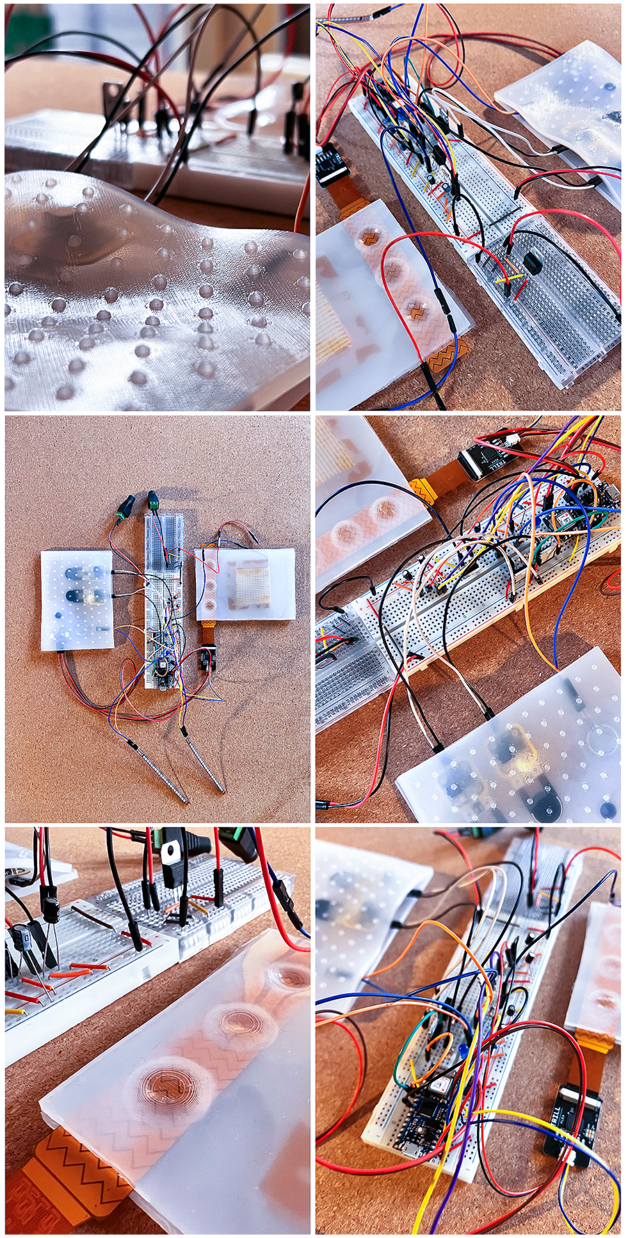
This stage was crucial, transforming the approach to electronics and design, with an emphasis on creating devices that are less noisy, less bulky, and lighter for body-connected communication. The prototype's development centered around the study and experimentation with various sensors and actuators in line with the design principles. Further advancements were made in communication logic to facilitate real-time tactile interaction over the internet using the MQTT protocol.

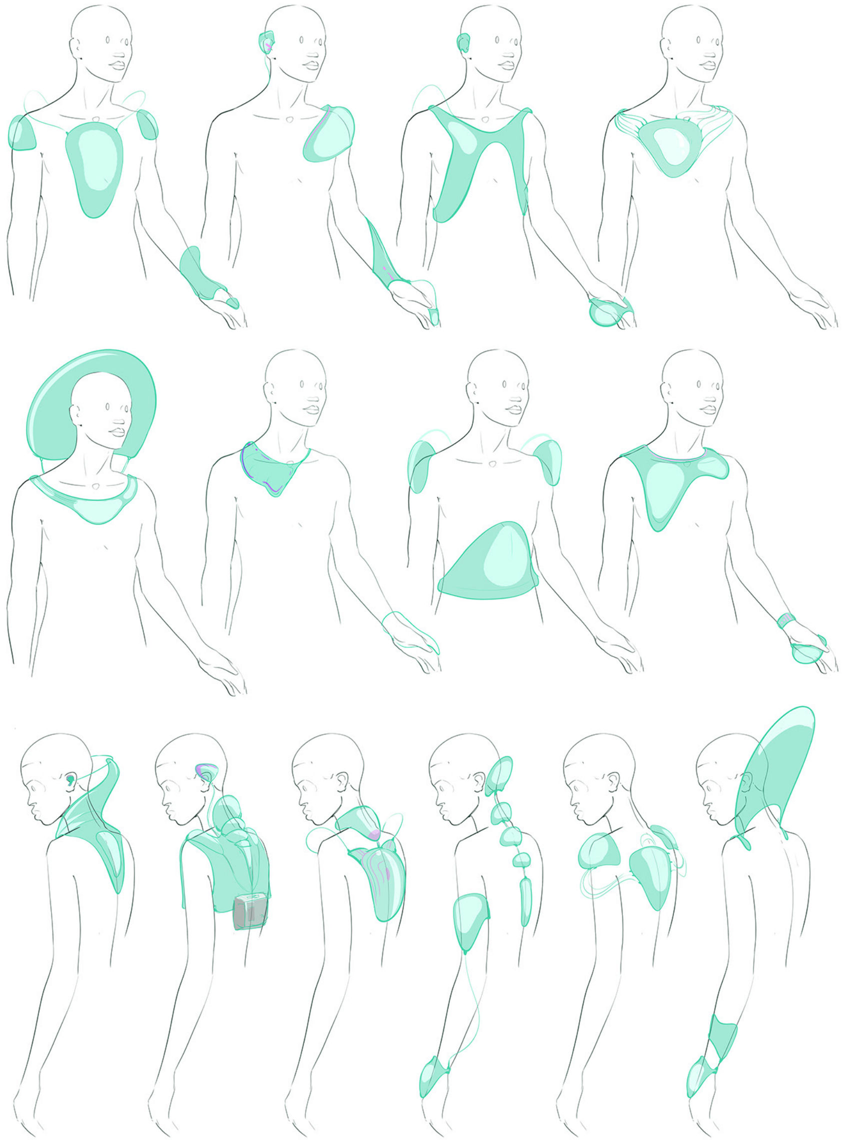
Due to the project's complexity, the decision was made to initially concentrate on achieving the desired functionality within a single circuit (object). Once the optimal function and components were established, the plan was to extend this interaction across two separate objects, thereby establishing a communicative loop between them.

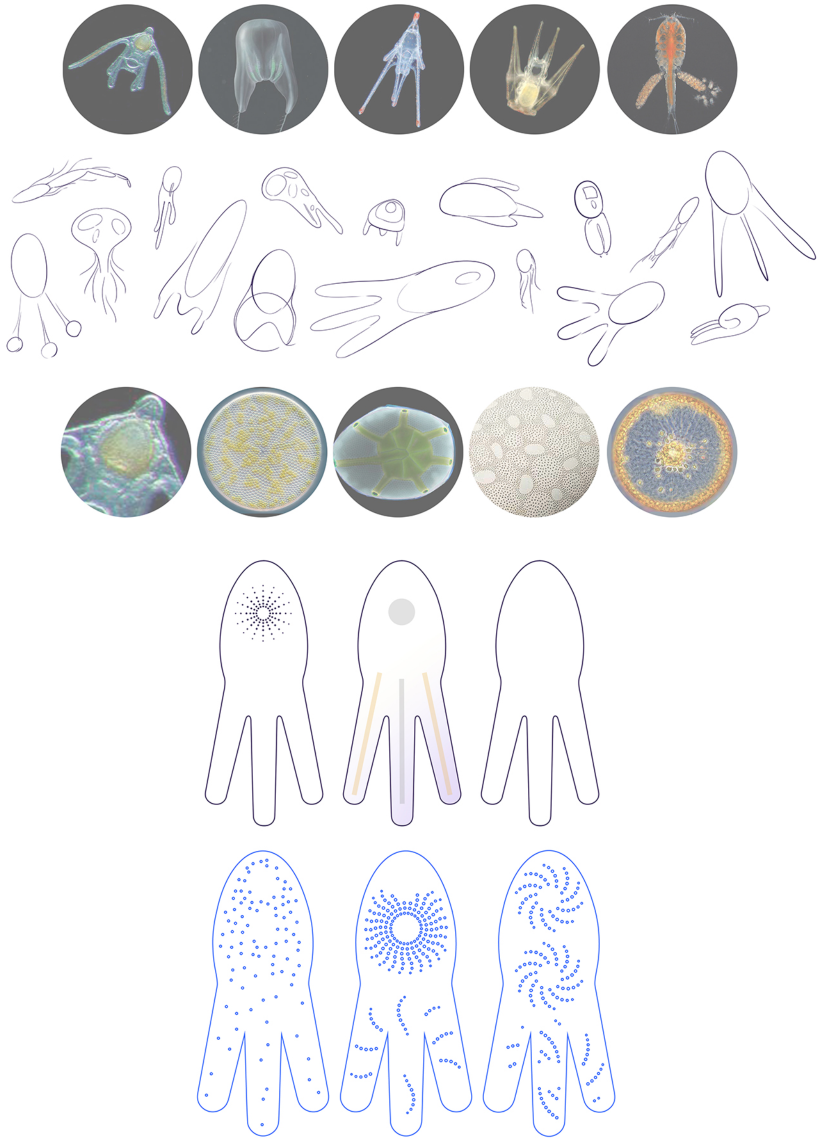


Key elements:

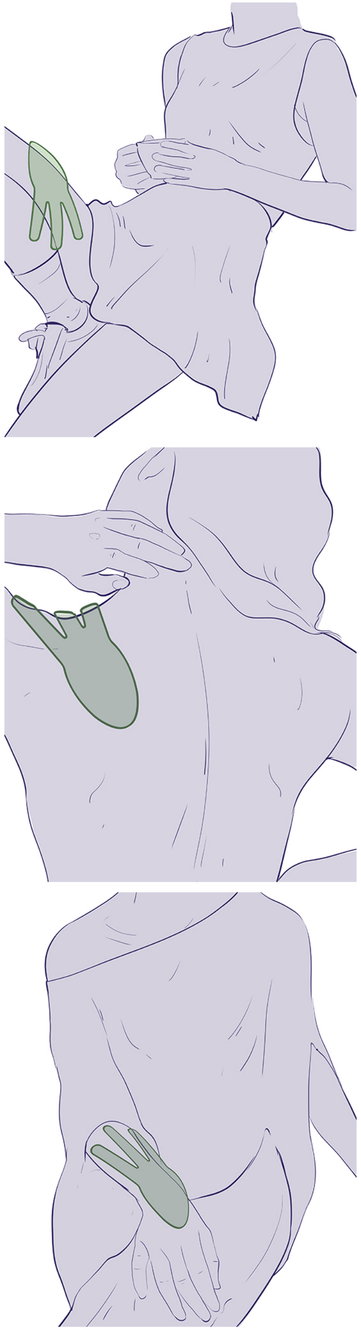
. Prioritizing the tactile sensation and material driven design approach.
. Integrating Shape Memory Alloy (SMA) to achieve a more organic and gradual response.

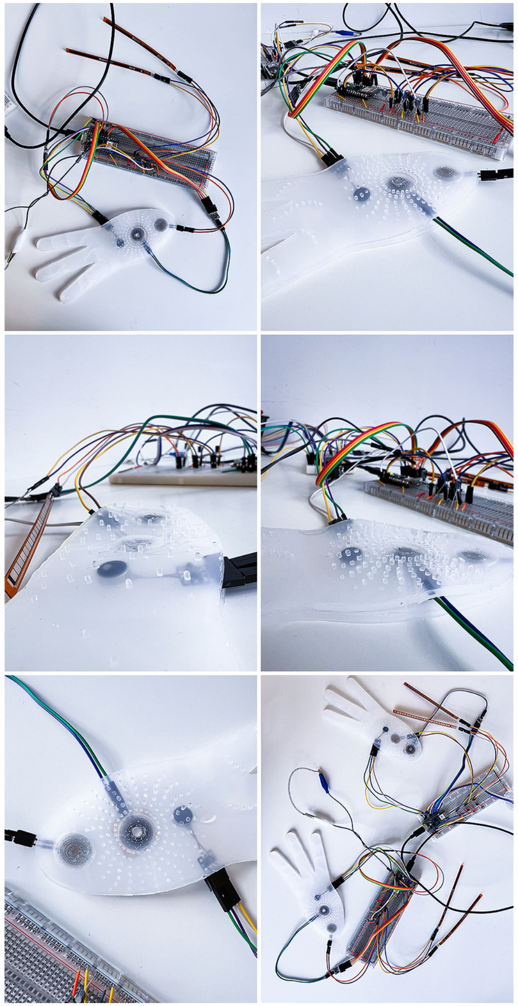






The organic body of OctoTouch was shaped using nature-inspired design principles which enhanced the sensory experience..





Three metaphorical states—vibration, flutter, and touch—were intricately linked to their respective tactile sensations and experiences:

. nuanced feeling of a passive touch.
. mimicking the vibrations of an active touch.
. fluttering heart, echoing rhythmic beats.


TACTILE
COMMUNICATION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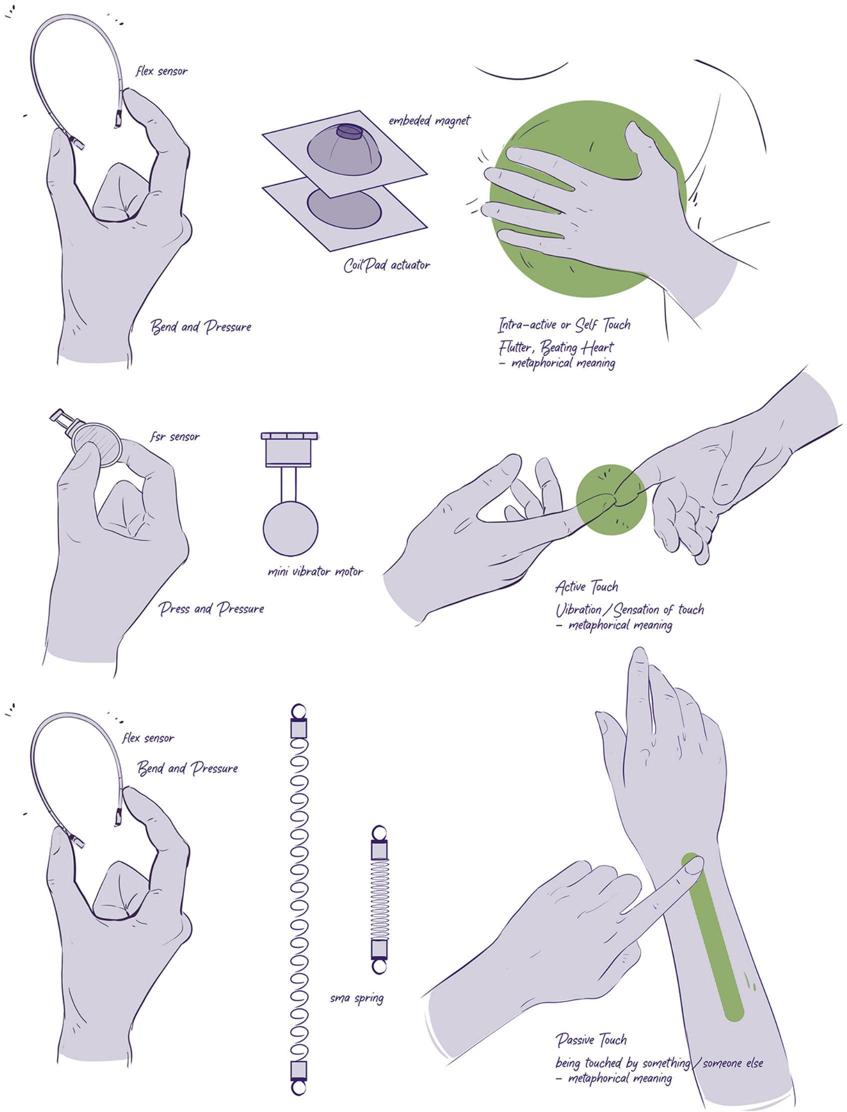
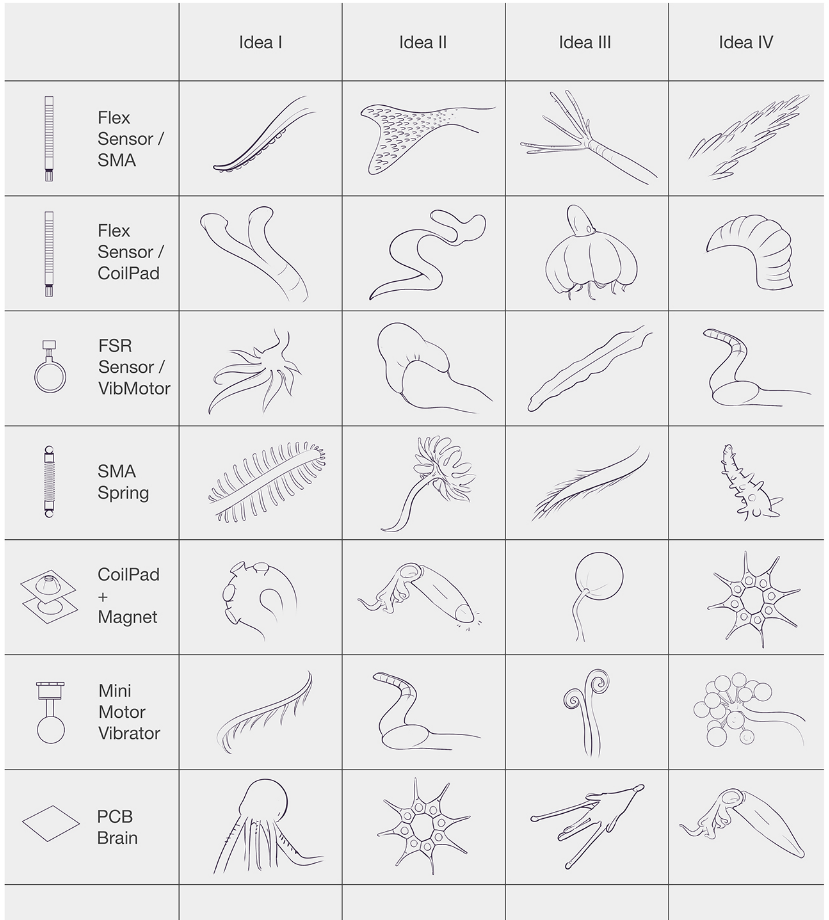
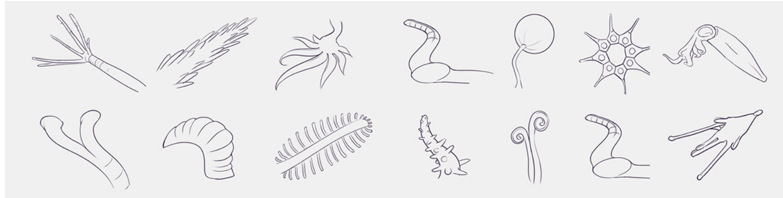
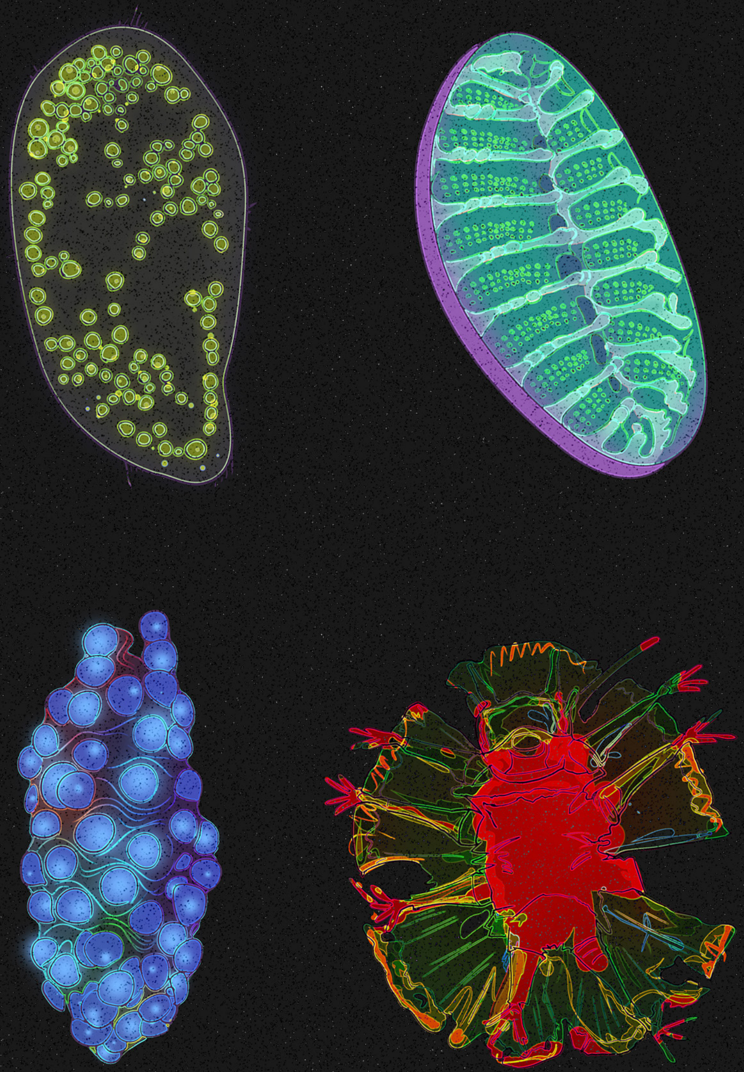

flex sensor
embeded magnet
CoilPad actuator
Bend and Pressure
Intra-active or Self Touch
Flutter, Beating Heart
- metaphorical meaning
fsr sensor
mini vibrator motor
Press and Pressure
Active Touch
Vibration / Sensation of touch
- metaphorical meaning
flex sensor
Bend and Pressure
sma spring
Passive Touch
being touched by something / someone else
- metaphorical meaning

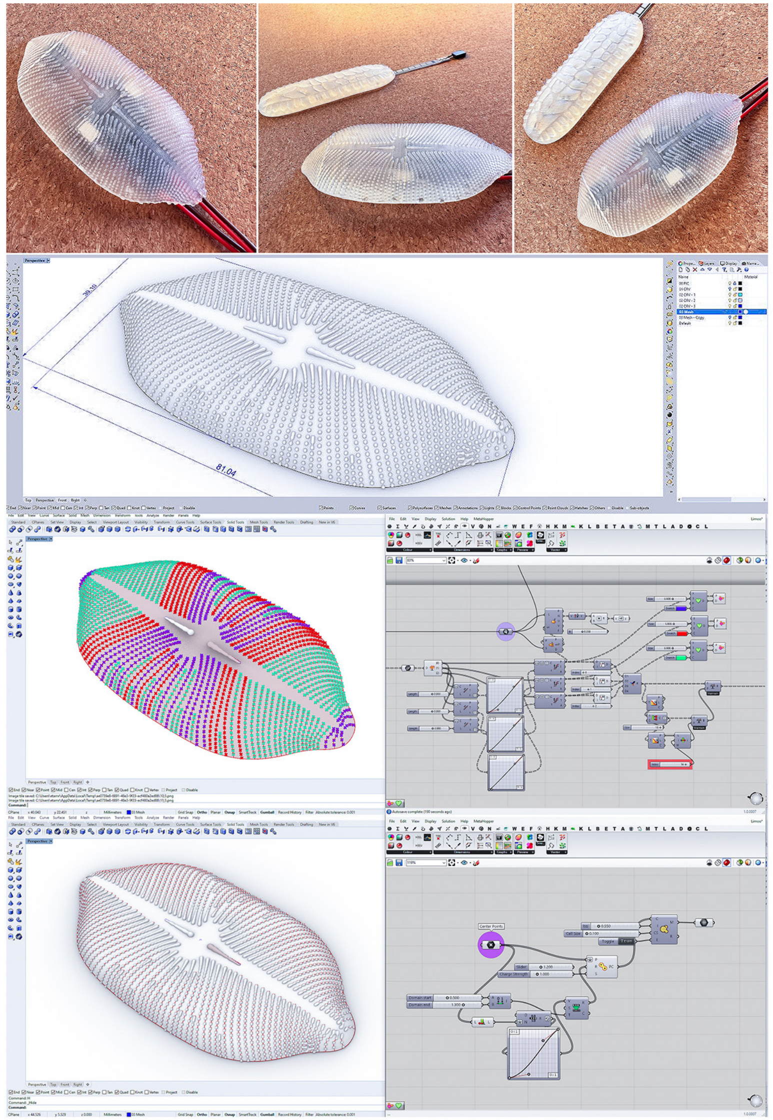
Morphological Chart

A morphology chart was then established, detailing the varied forms and textures of each component, with a focus on their functional and structural attributes. This led to the synthesis of the Symbionts' design, which amalgamated 28 distinct concepts from the chart, consistent with the metaphorical frameworks previously established.

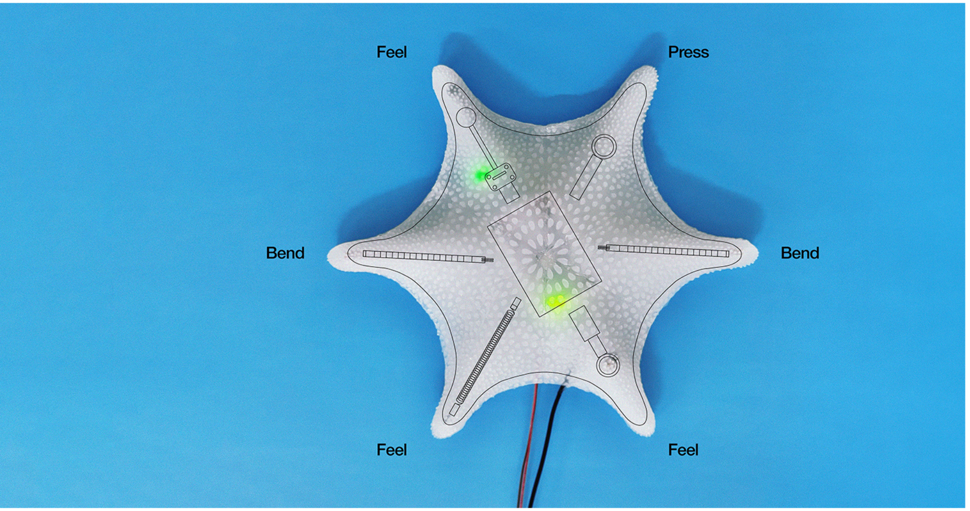




Studying Different Biomorphic Textures Through Painting

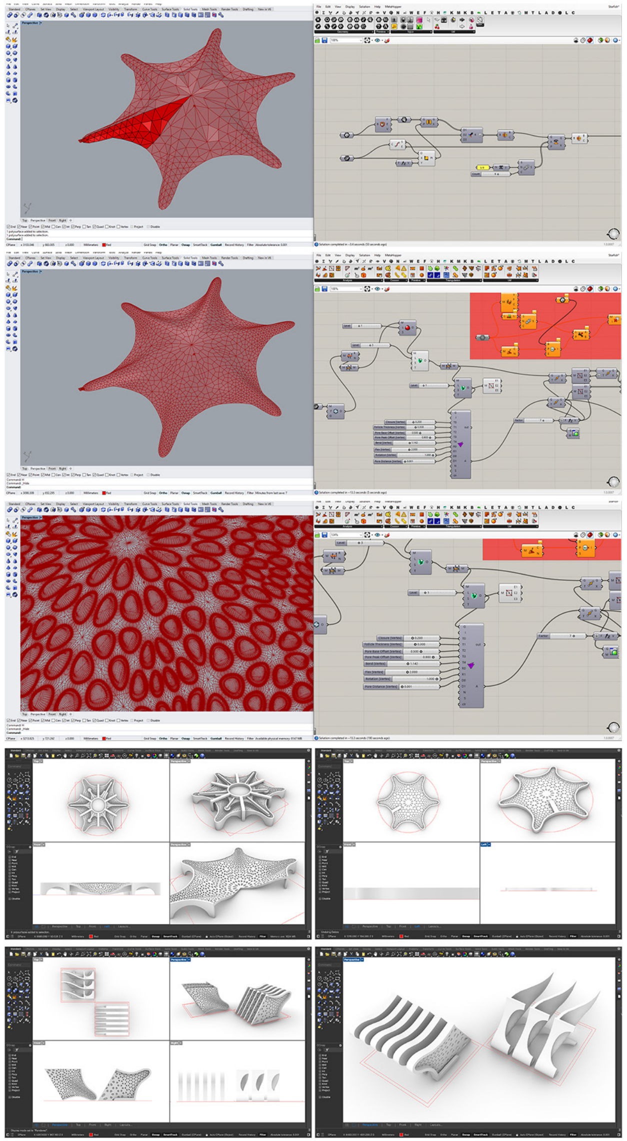


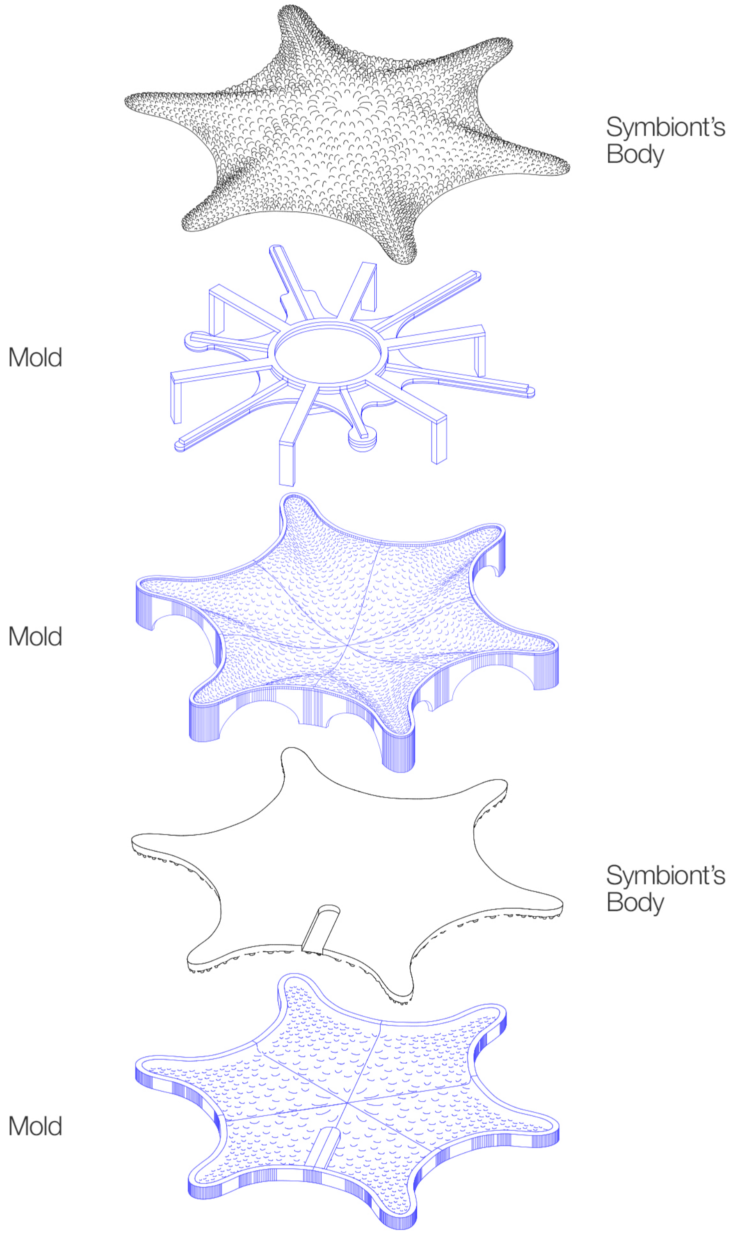
Studying Different Biomorphic Textures Through 3D Printing Transparent Engineering Resin



The fabrication of the Symbionts involved 3D-printed mold making and silicone casting. The process commenced with 3D modelling of the Symbiont's body and its corresponding mold, divided into two main parts (top and bottom) and further segmented into six pieces per side to accommodate 3D printer specifications. These pieces were then assembled using a special sealing RTV glue, ensuring a perfect seal for the silicone casting, which was performed twice to produce a pair of Symbionts.

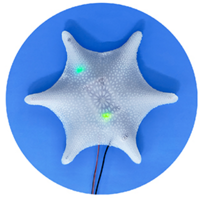
Designing the mold also included creating a bone structure to form a cavity within the Symbiont's body, intended for housing electronics. These processes were meticulously designed to accommodate the form, function, and material responses to each embedded sensor and actuator.

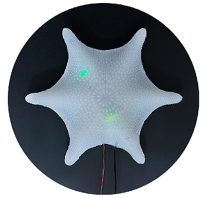




3d modelling and 3d printing

Mold Making





Symbiont I

Sending tactile signals (activating sensors)
Recieving (feeling) tactile signals through actuators

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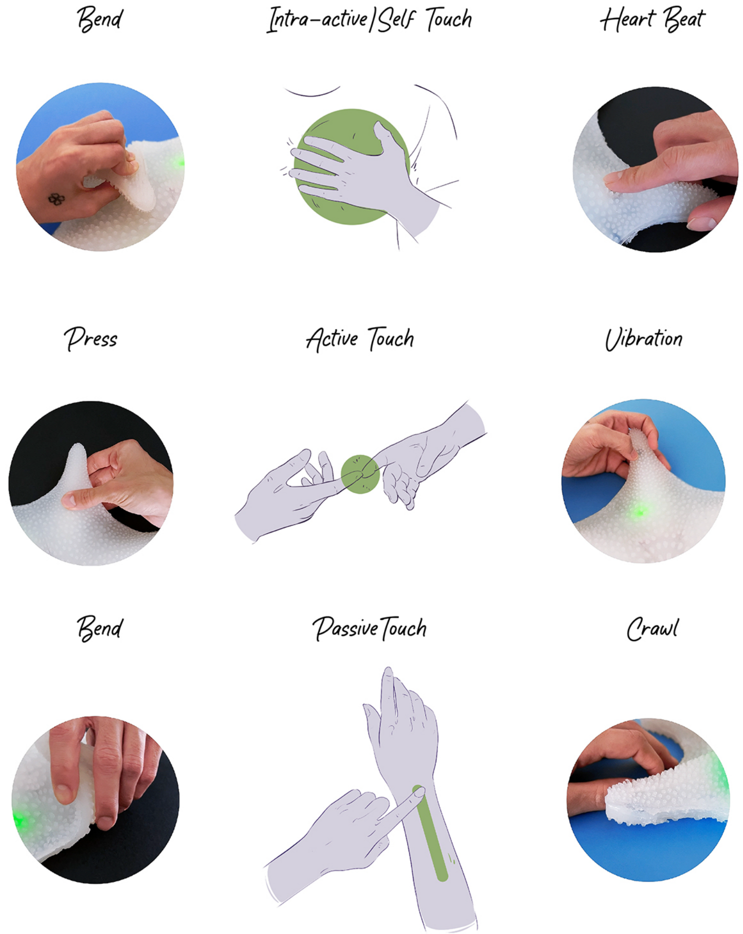
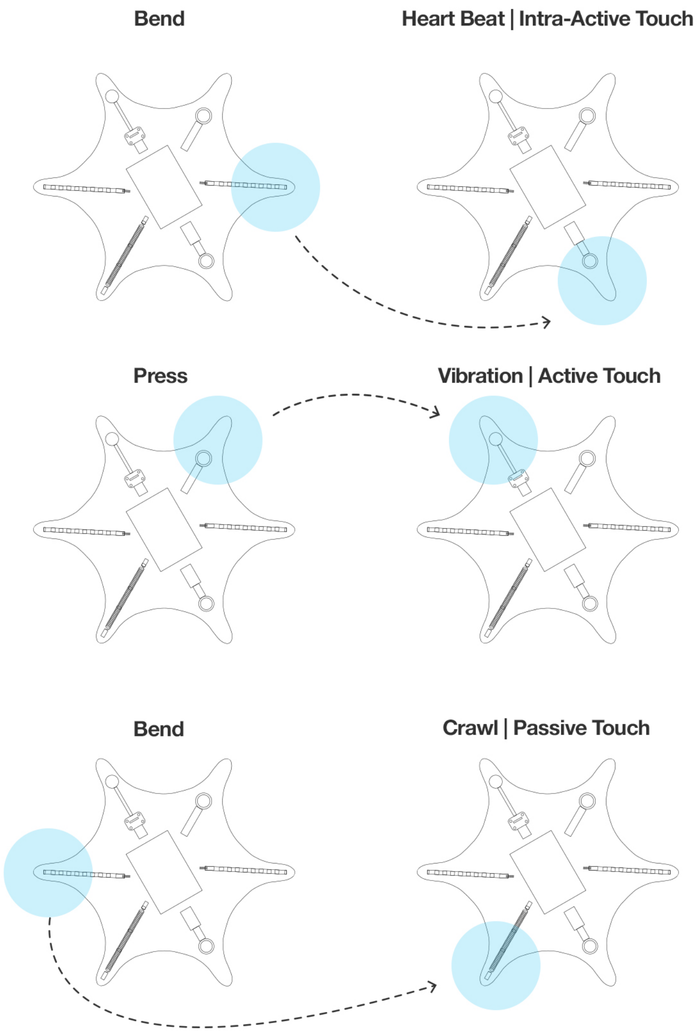
⟵

Symbiont II

Recieving (feeling) tactile signals through actuators
Sending tactile signals (activating sensors)

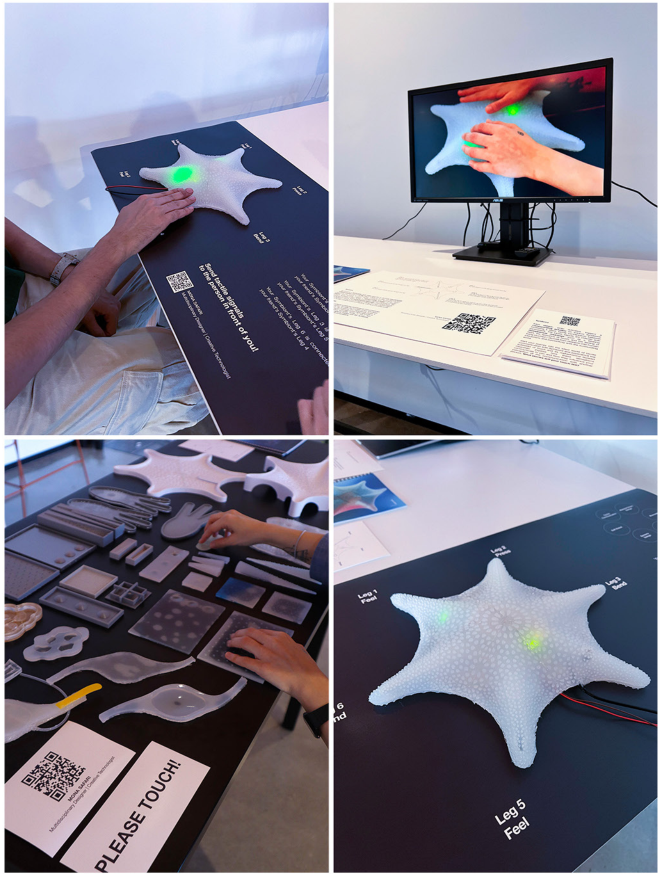


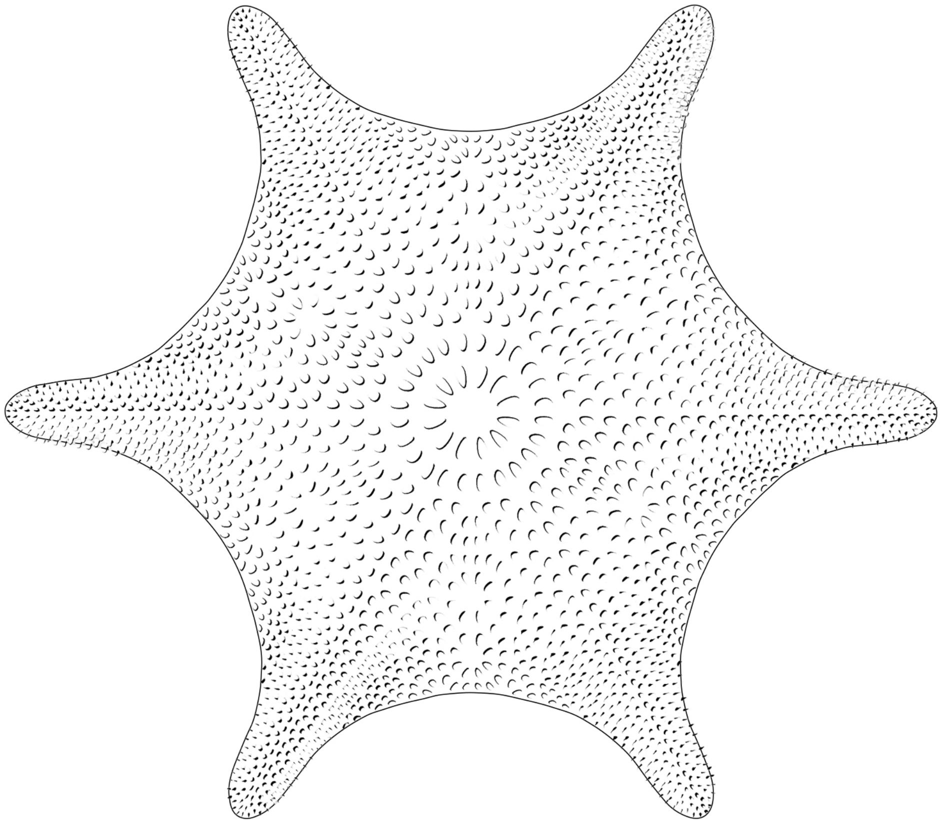


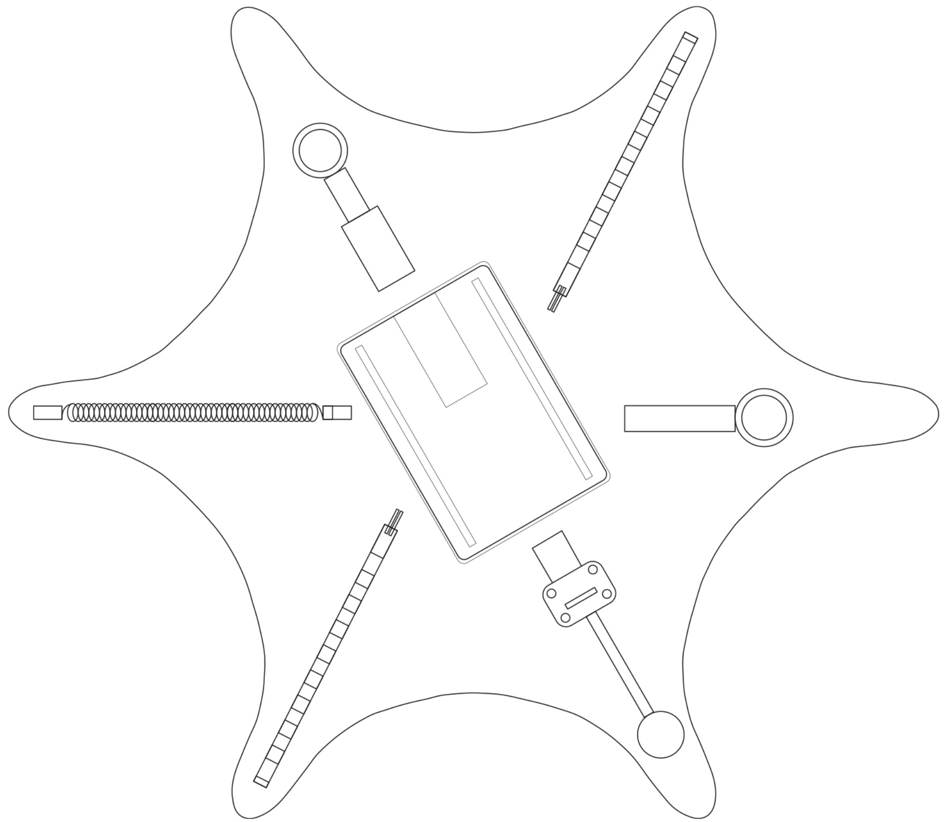
SYMBIONT: Tactile Communication

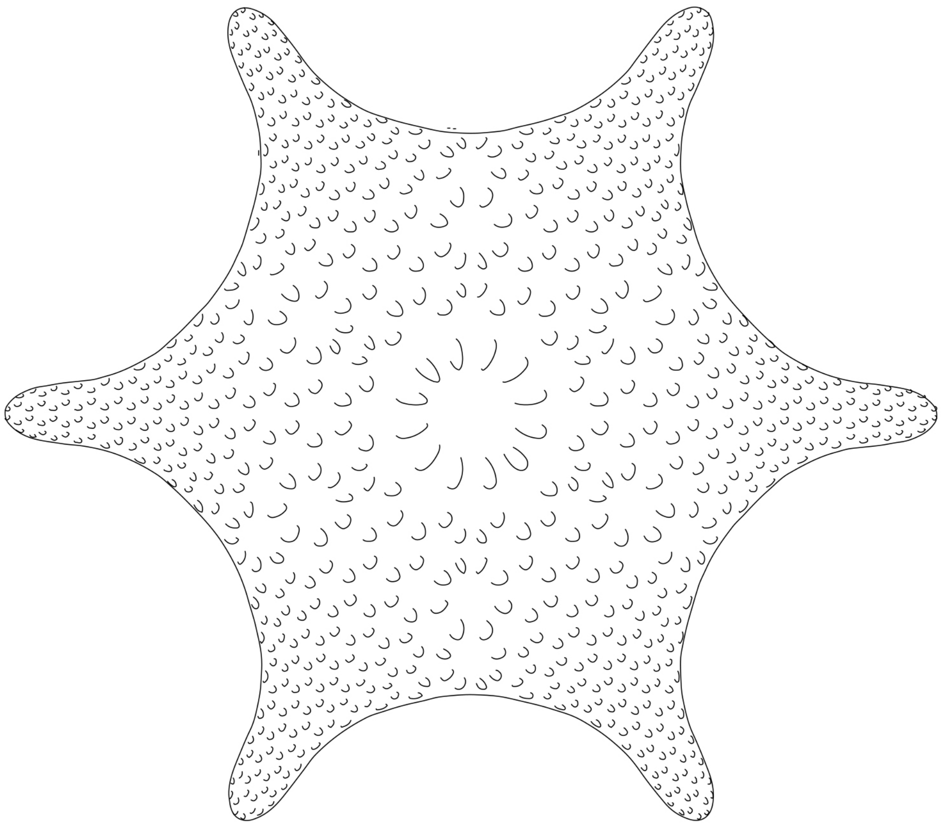
EXHIBITIONS

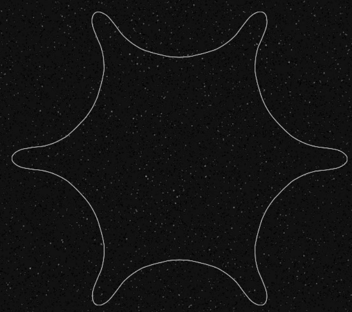
Thesis Digital Futures Exhbition: OCADU Waterfront Campus, Toronto, April 2024
Open Hardware Summit, Montreal, May 2024


Send tactile signals to the person in front of you!
PLEASE TOUCH!
Leg 1
Feel
Leg 5
Feel









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