
JUNI SUN NEYENHUYS
WORKS 2018-26

Up to 80% of the environmental impact of products has its origin in the design phase. I aim to design for positive environmental impact.

I am a **material designer** based in Helsinki and Berlin, working at the intersection of **biomaterial innovation**, **conceptual design**, and **cirularity**. Guided by the intelligence of natural systems, I explore how **natural resources** can be transformed into materials and products that reintegrate into **biological cycles**.

After graduating with a bachelor's degree in Textile and Material Design from Weißensee School of Art and Design Berlin in 2021, I co-founded **mujō**, a material innovation company developing **seaweed-based biodegradable packaging materials**. Working across material development, product strategy, and design, my team and I brought the material from **laboratory research to pilot-scale production**. In collaboration with research partners such as the Papiertechnische Stiftung (PTS) and the FILK Freiberg Institute, we developed its **technical properties** and **scalability**. Along the way, the project received **funding** and recognition, including the Make Tomorrow New Award and support from the German Federal Ministry of Education and Research (BMBF), and enabled collaborations with industry partners across the product lifecycle.

Design, for me, is about engaging with **complex problems** through **material exploration** and **collaboration** in **interdisciplinary teams**. I believe in the power of design to make **future visions tangible** and **desirable**. My work is guided by the alignment of four key criteria: **human desirability**, **ecological sensibility**, **technological feasibility**, and **economic viability**. My practice spans experimental material research and development, prototyping across physical and digital contexts, concept development, and visual storytelling.

I recently graduated with a Master's in Contemporary Design from Aalto University. Alongside this, I am developing the **Disruptive Materials Institute e.V.**, a nonprofit platform for interdisciplinary research and collaboration around socially and ecologically responsible material futures.



hello@junisun.com

junisun.de / mujolab.com /
disruptive-materials-institute.com

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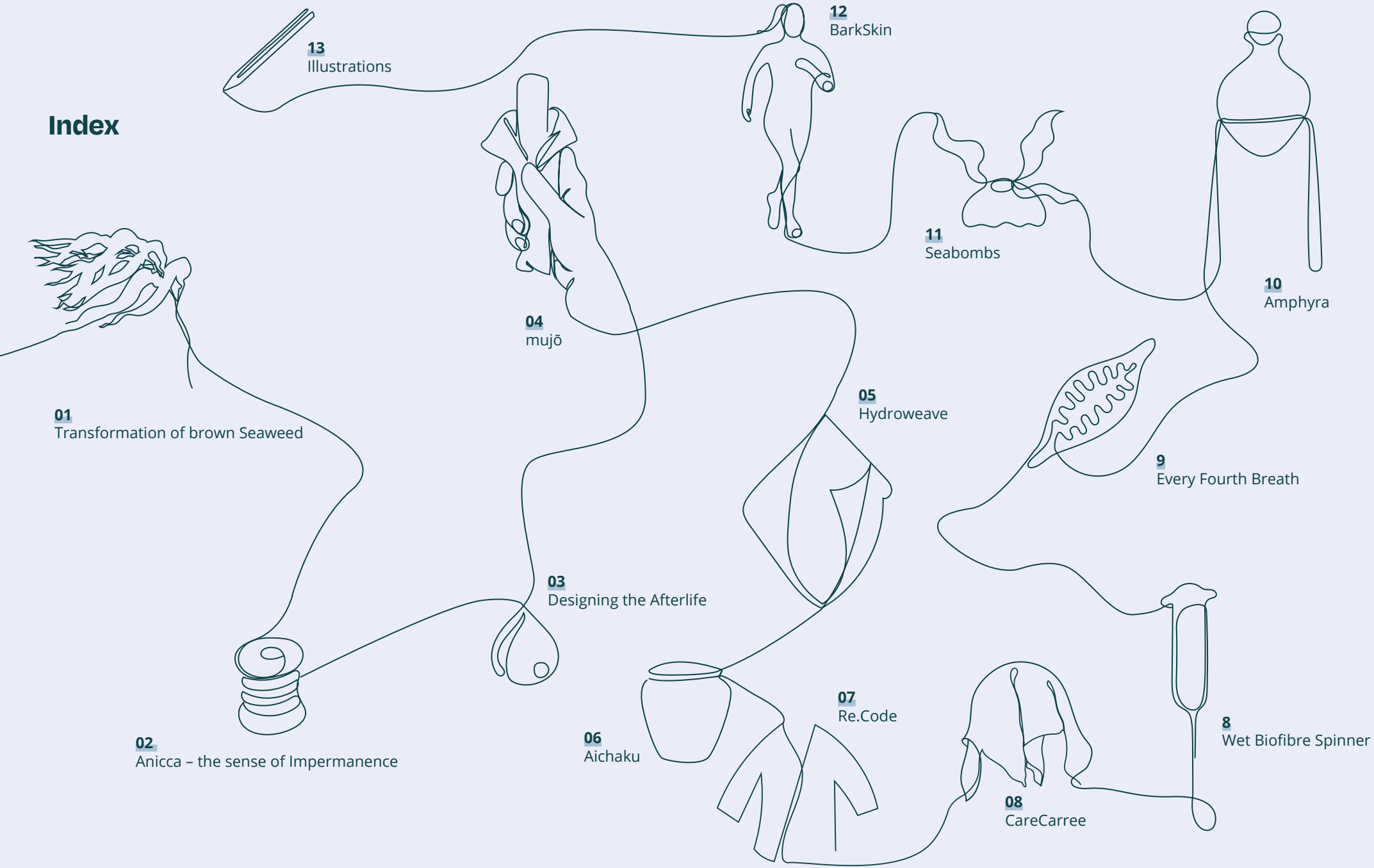
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Transformation of brown Seaweed

2017/ 2018, School of Art and Design Weissensee

Project video

Most of the earth is covered by water and offers **enormous potential for growing seaweed**. This resource does not need fresh water or agricultural land. Moreover, seaweed produces oxygen and purifies the water. Due to its physical and mechanical properties of high stability and elasticity, **many possible applications** can be envisioned from a material designer's perspective.

Seaweed has various analogies to the materials we already know. It can have the feel and appearance of **leather** or rubber. But it can also be transformed into a material, which is similar to **paper, plywood** or **plastic.**

The main component of brown seaweed is alginate: a biopolymer that can be extracted, transformed into a gel and spun into a strong yet flexible **yarn** in various thicknesses. A range of purely **natural pigments** that originate from **microalgae** can be added to achieve sophisticated colour hues. This allows a wide range of **textile applications**. Such utilisation of seaweed provides a **closed loop life-cycle** – from ecologically useful cultivation, through processing and use, to recycling.

Transformation of Seaweed is a material research project, exploring the potential uses of the whole seaweed Laminaria. The result is a material library that archives the various processing techniques.



In the material archive, all samples are sorted according to their characteristics and treatment.



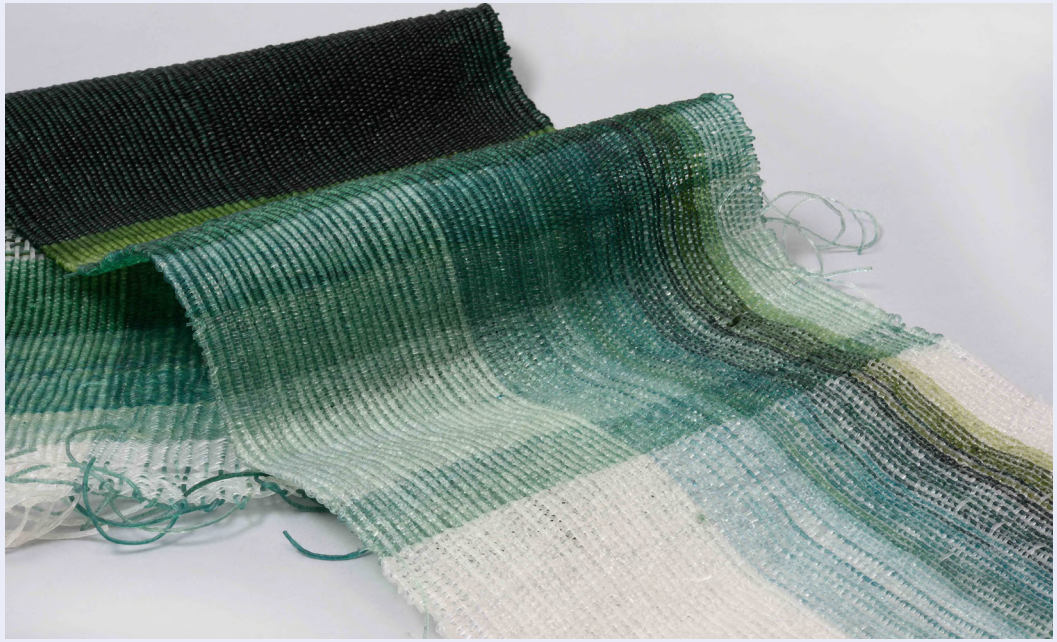
Seaweed can be treated to behave like leather and processed into textile surfaces.



Visiting a seaweed farm
at the Baltic Sea



left: seaweed, middle: alginate, right: alginate yarn coloured with microalgae



A textile made of 100% alginate yarn

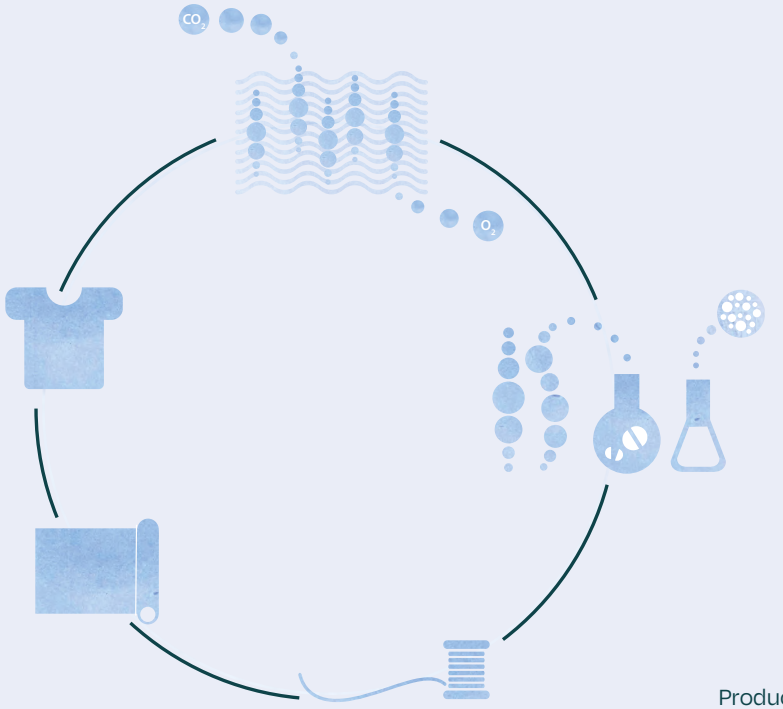
Anicca - the sense of Impermanence

2018, School of Art and Design Weissensee
In Collaboration with Malu Lücking, Annekathrin Grüneberg &
Technical University Berlin

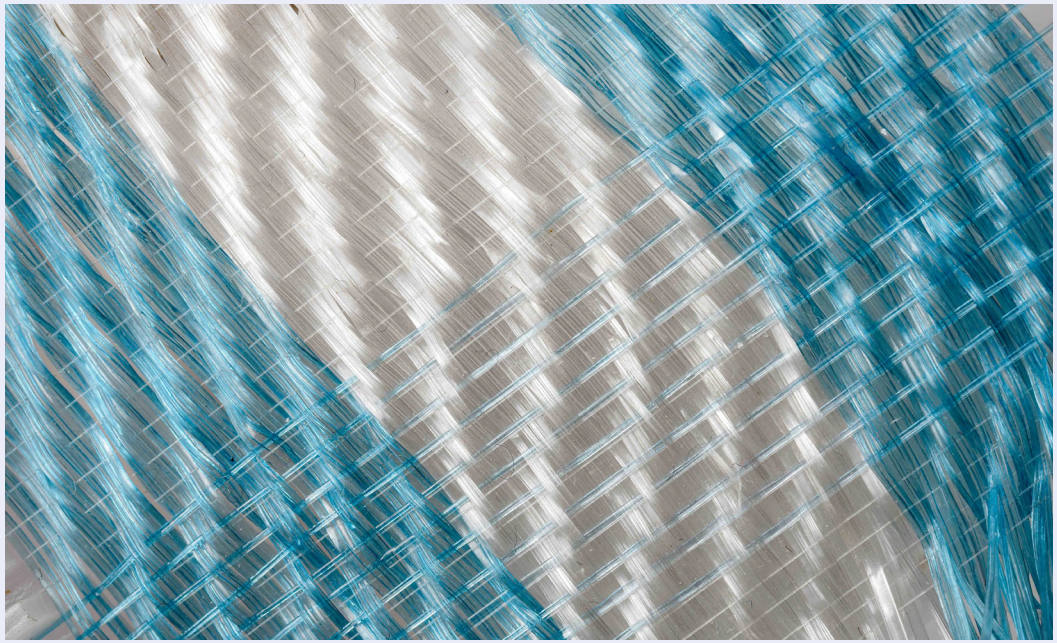
Project video

During the first seaweed project I went to the Technical University in Berlin and pitched in the biopolymer lecture, hoping to win a scientific team member for the project. Luckily, I could convince Annekathrin, a chemical and process engineer, and Malu, a biodesigner, to participate in the project. The three of us developed the yarn further in the laboratories of the technical university into a very fine, stable yarn. We built a small spinning machine to produce it.

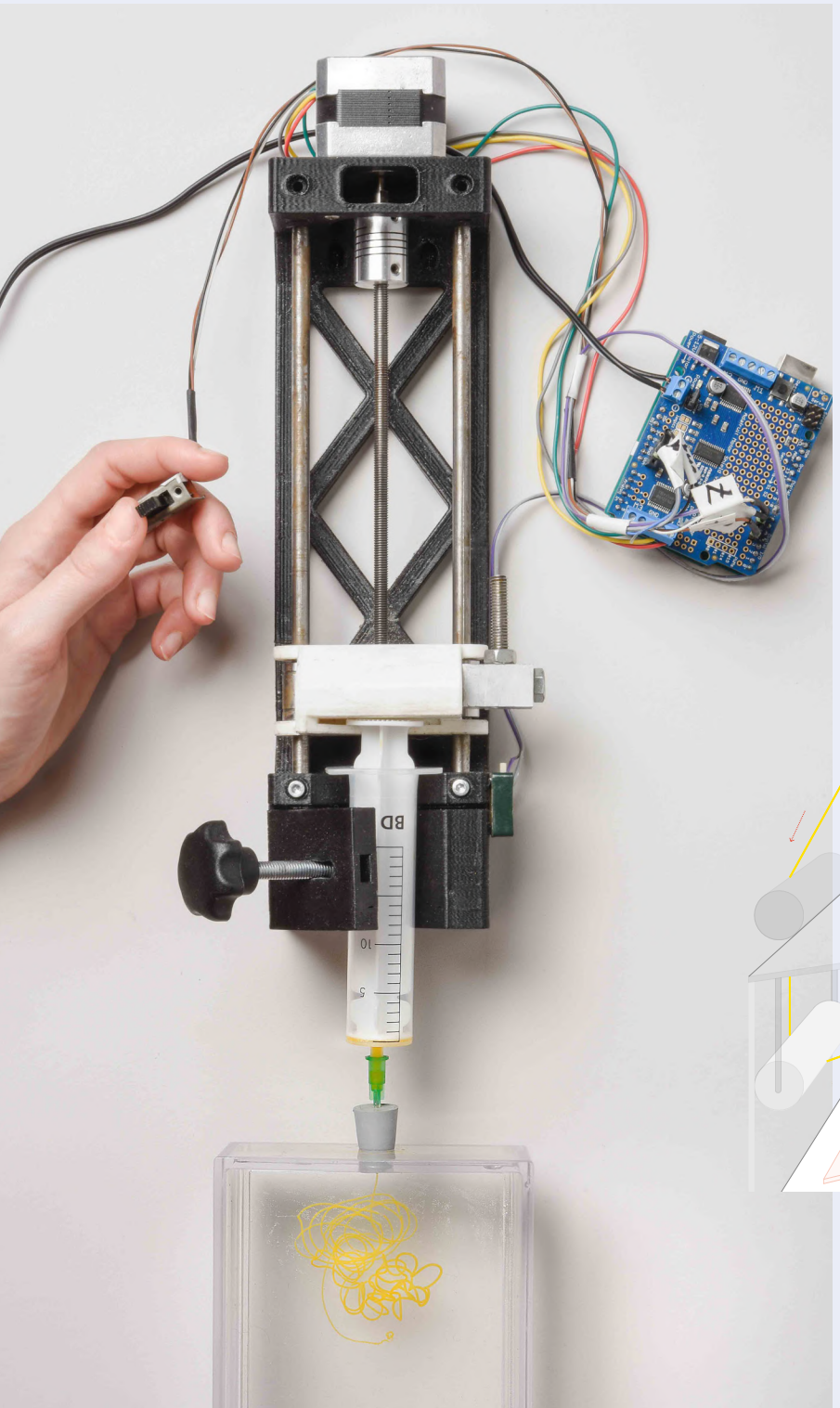
Since the Industrial Revolution, regular consumption has become part of our western lifestyle. It is hard to imagine that most people will embark on a radical change in the production of goods and purchasing behaviour in the coming years. **Fast fashion** is mostly made of **synthetic fibres**, such as polyester. A material that will **never degrade**. So, if you can't extend the life of products because the need for consumption remains unbroken, **we should try to shorten the life of our materials.**



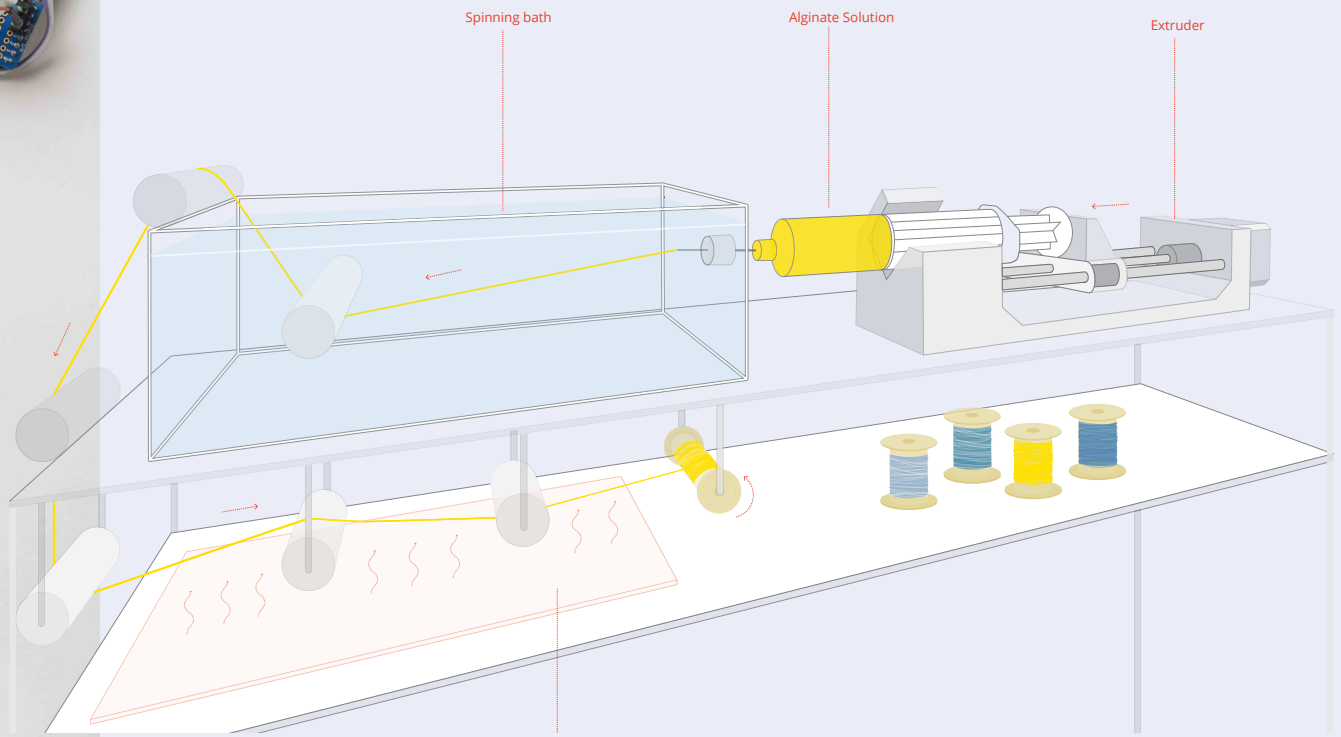
Product lifecycle



Alginate yarn coloured with pigments from microalgae



What if we watched our wedding dress rotting on the compost? What if we dissolve the festival outfit in the washing machine after the party?



Developing and building a spinning machine



Traditional Makramee can transform the yarn into a net for fruit and vegetable.



The fine seaweed based yarn can be knitted by hand.



The seaweed yarn can also be transformed into a nonwoven without additional binders.



Archiving the yarns was a large part of the work.

Designing the Afterlife

Project video

Animation video

2020/2021, School of Art and Design Weissensee
Bachelor Thesis

The idea of biobased and biodegradable packaging materials as an alternative to petroleum-based, non-degradable ones is nothing new. One key reason they have not been used for a long time is that **disposal infrastructure is lacking.** The question of how these materials can be returned to the biological cycle remains unanswered.

The project "Designing the Afterlife" deals theoretically and practically with the **development of disposal scenarios** for seaweed-based, biodegradable packaging materials to close the biological material cycle and use the currently **existing disposal infrastructure.** The result is the **"Water to Water"** product series: packaging for solid and oil-based cosmetics that **dissolves in water** (the first time the product is used) and is disposed of in the sewage system, as it breaks down completely by microorganisms in the sewage treatment plant.

The work focuses on the **communication** of the product to the **consumer.** The packaging communicates how to dispose of it properly, with disposal **designed to be simple**. Part of the communication strategy is a **QR code** printed on the packaging, which leads to a **video** that explains the **afterlife** of the packaging **clearly** and **playfully**.





Visit and interview of composting plant managers concerning the topic of biodegradable packaging



Developing and testing different packaging designs



Screenprinting with algae-based inks

Zeit	Alginat
[d]	[%]
0	0,0
1	18,2
2	72,0
4	80,5
7	93,0

I tested the biodegradability together with the waste water laboratory of Berliner Wasserbetriebe. The tests showed that the film had degraded after seven days.



Seaweed bath packaging



Shampoo bar packaging



„Water to Water“ packaging series for solid and oil-basd cosmetics: seaweed bath, bath salt, bath oil, soap bar, shampoo bar, tooth tabs

mujō

Project video

2021-.2024
Co-Founder, Designer
Material innovation company at the intersection of design and material science

At the beginning of 2021, I co-founded the material innovation company **mujō**. mujō envisions a future where current packaging materials become future resources. We develop innovative, **seaweed-based packaging materials** that **biodegrade straight after use, naturally and harmlessly.** The first product being worked on is a packaging film that will be sold to B2B customers.

From 2021 until 2023 we worked on the producibility of the film on a **pilot scale** and the further development of the material, our **business model**, **funding** and **building partnerships** with **stakeholders** for each step in the product life cycle to create a **circular ecosystem**.

We envision a future in which materials of today support life of tomorrow.



Developing a continuous production of the film on a pilot plant



Pitching our concept to various players from the packaging industry or investors



The development of different formulations enables diverse haptic properties.



The recipe of the material, the shape and colour of the bags were specially developed for Vyld tampons. We produced them as a small series for the first tampon users. Each piece is unique.



Display window made from algae film and gras paper from GMUND



Einhorn condoms wrapped with mujō



Customized bags for Stricken 3000

As head of product development and designer, I acted as the intermediary between customers and Annekathrin, the Head of Technology Development, while also overseeing design, brand development, and marketing.

In this role, I **translated material innovation into customised packaging solutions**. Working with the sustainability-driven company **Einhorn**, I developed a packaging series that replaced conventional packaging for condoms and menstrual products with mujō's material, including an algae-based print. In collaboration with the Berlin-based company **Vyld**, which develops seaweed-based tampons, we developed and produced a limited packaging series. I also worked with **GMUND** on **window packaging applications,** and with the local yarn shop **Stricken3000** on a limited-edition series of customised bags. Across these projects, I focused on adapting a single material system to different use cases, combining functional requirements with brand identity and material storytelling.

Hydroweave

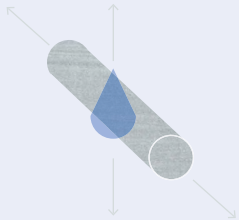
Project video

2019, School of Art and Design Weissensee
In Collaboration with Stefanie Eichler &
Max-Planck-Institute of Colloids and Interfaces

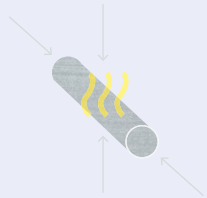
In the future, our designed living space will be high-tech and shaped by materials that can **react to stimuli** and influences from the environment. We are also asked to use our resources in an ecologically sustainable and intelligent way.

Cellulose is one of the most frequently occurring building blocks and the most often used renewable raw materials in nature. Cellulose is used to make paper, which can also be turned into yarn. Cellulose fibres can absorb a lot of water. The individual fibres swell differently depending on the fibre direction; when dried they shrink again.

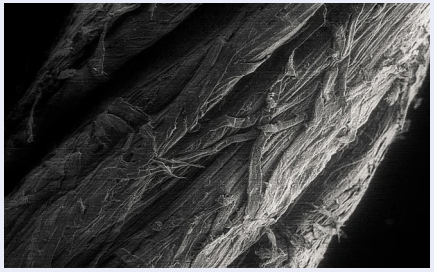
In the project HYDROWEAVE, this natural principle of **"hygroscopic movement"** was transferred from nature onto a **textile material system:** paper yarn made of cellulose fibres is woven into a surface. The type of yarn twist and the specificity of the fabric construction can be used to regulate the shape change of the fabric through moisture. When the fabric releases moisture back into the environment, it returns to its original shape. This process is both reversible and repeatable. The material system thus serves both as an indicator and a regulator of the surrounding humidity. The result is a **smart material** that works without any technical aids, such as sensors and is produced entirely from renewable materials.



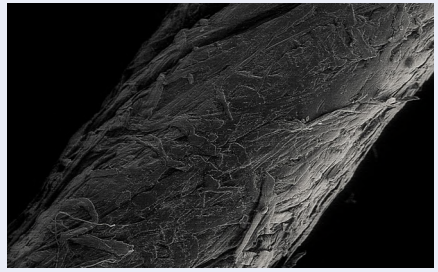
Cellulose fibre swells due to water absorption.



Cellulose fibre shrinks due to water release.



wet paperyarn (microscopic scan)



dry paperyarn (microscopic scan)



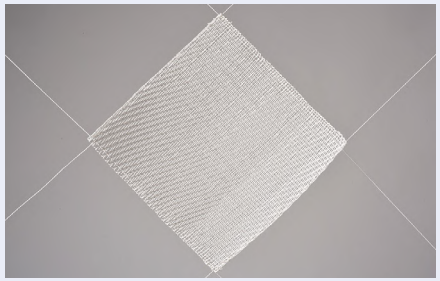
wet paperyarn



dry paperyarn



wet module from paperyarn



dry module from paperyarn







An adaptive system that regulates the humidity of the air

Aichaku

Project video

2021, Japan
Self initiated Research– and Filmproject
in Collaboration with Kilian Schneider

Things store culture, knowledge and values[1]. In our fast-moving world of abundance, product life cycles are becoming even shorter. This leads on the one hand to the accumulation and on the other hand to the rapid disposal of things and possessions. This raises the question of authenticity and sustainability. **I wanted to explore whether design can be used to specifically sensitise an emotional connection to objects.** In the spring of 2020, I went to Japan to conduct a research project, which involved exploring the Japanese concept of "Aichaku".

„The Japanese language uses the term **Aichaku** to describe emotional attachment to an object: It is a kind of symbiotic love for an object rooted in animism, which deserves affection not only for what it does but for what it is. If we acknowledge that there is Aichaku in our designed environment, we can make a better effort to design objects that evoke three things in people: **feelings, care and the desire to own them for a lifetime.**"[2]

I explored the material culture of Japan – a country in which, although it is modern, highly industrialised and mechanised, traditional craftsmanship and the processing of local materials still exist and have a high value. During the trip, I visited **artisans** and **studios** and **conducted interviews** to learn as much as I could about Aichaku and how it can be created consciously. The research was the conceptual groundwork for **Re.Code**.

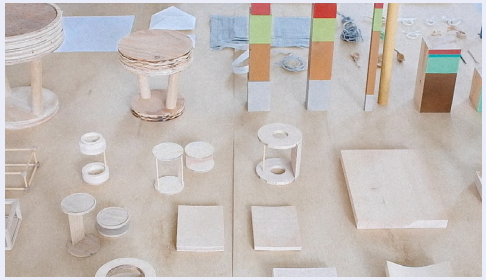
1 Ten Principles for Good Design, Dieter Rams, 2017
2 The Laws of Simplicity, John Maeda, 2006



Ko Kado from Kaisoe: washi paper art print



Nakagawa Shuji: wood work



Graf Studios: product and furniture design



Takuya Tsutsumi: urushi lacquer



Awabi Ware: pottery



Mio Heiki: art of kintsugi



Susuke: knife forging



Awaji Island Project: indigo dyeing

Re.Code

2020, School of Art and Design Weissensee
In Collaboration with Lobke Beckfeld, Rebecca van de Sand, Suzan Camlik, STVI, TITV, TPL

How can we transform natural fibre waste into durable textiles that are emotionally enganging?

Nowadays discarding nearly new textiles and clothing has become a cultural practice. The origin of the problem may lie in the **failed emotional attachment** to the object. The resulting symptoms are masses of textile waste. Re.Code wants to counteract both the short life span of textiles and clothing and the growing amounts of textile waste that is generated during the production and consumption cycles.

Cellulosic textile waste from the production process, such as short fibre waste, selvedges or long yarn waste, is selected carefully according to fibre quality and colour and **spun into new yarn** with a small amount of added virgin fibre content. Since the available waste is constantly varying in quality, texture and colour, each yarn is unique.

The yarn is woven into double-sided textiles that include an individually chosen text on one side, and a pattern on the other side, which the **Re.Code-software** generates. Depending on the text, a different pattern is generated, which is woven or knitted, making the **textile a personalised piece.** The text can also be used to communicate the textile supply chain and create transparency about the entire textile manufacturing process.



The textile waste fibres were divided into three different qualities and spun into new yarn with a percentage of fresh fibre.

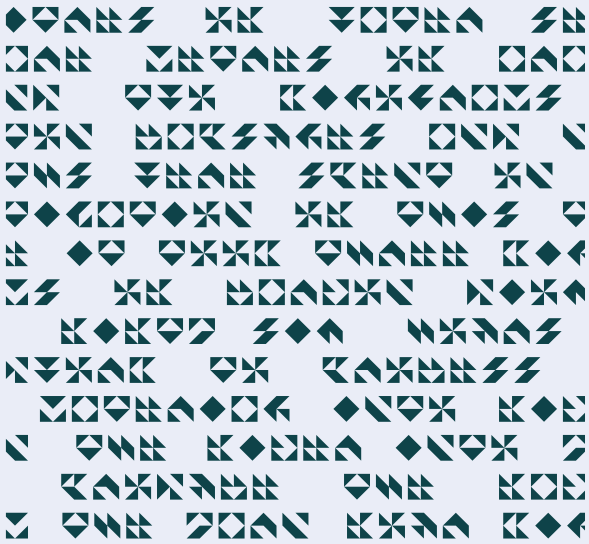
1. Write a Text

SIX AND A HALF KILOGRAMS OF CARBON DIOXIDE, TWELVE THOUSAND FIVE HUNDRED LITRES OF WATER, SEVEN SQUARE METRES OF ARABLE LAND, TWO KILOGRAMS OF COTTON CAPSULES AND NINE MONTHS WERE SPENT ON THE CULTIVATION OF THIS TEXTILE. IT TOOK THREE KILOGRAMS OF CARBON DIOXIDE AND FIFTY-SIX HOURS OF HANDWORK TO PROCESS THE RAW MATERIAL INTO FIBER, SPIN THE FIBER INTO YARN, AND PRODUCE THE FABRIC FROM THE YARN. FOUR KILOGRAMS OF CARBON DIOXIDE WERE USED FOR TRANSPORTATION. TREAT IT GENTLY.

2. Go to re-code.info

3. Select a typeface

4. The Software will generate a pattern



5. Woven Text on the inside of the textile



6. Woven Pattern on the outside of the textile







knitted Re.Code pattern



Samples of work with recycled fibres and the codes

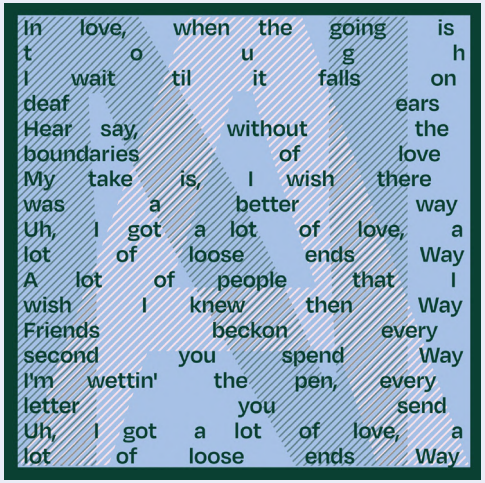
CareCarree

2025
further development of Re.Code
self initiated project

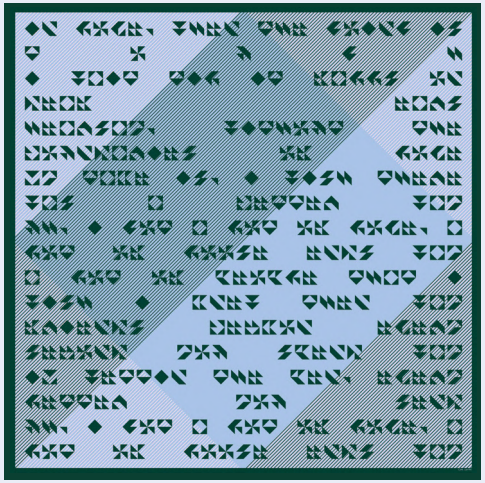
CareCarrée further develops the Re.Code principle of translating personal text into unique textile patterns. It applies the encoding system to the **silk carré** – an object that has carried personal, cultural and symbolic meaning across different eras and contexts.

Through the Re.Code software, a **personal story**, **memory** or **message** is translated into an **individual pattern** and printed onto the scarf. As the visual composition is generated from the encoded text, each CareCarrée becomes unique to its wearer.

Produced on demand, the project explores how digital personalisation can create more **meaningful relationships** between people and textiles – shifting value from novelty and mass production towards personal significance and longevity.



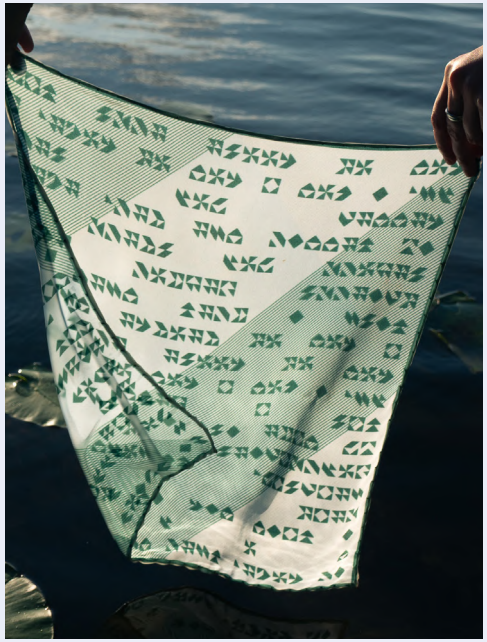
Personal text



Encoded pattern



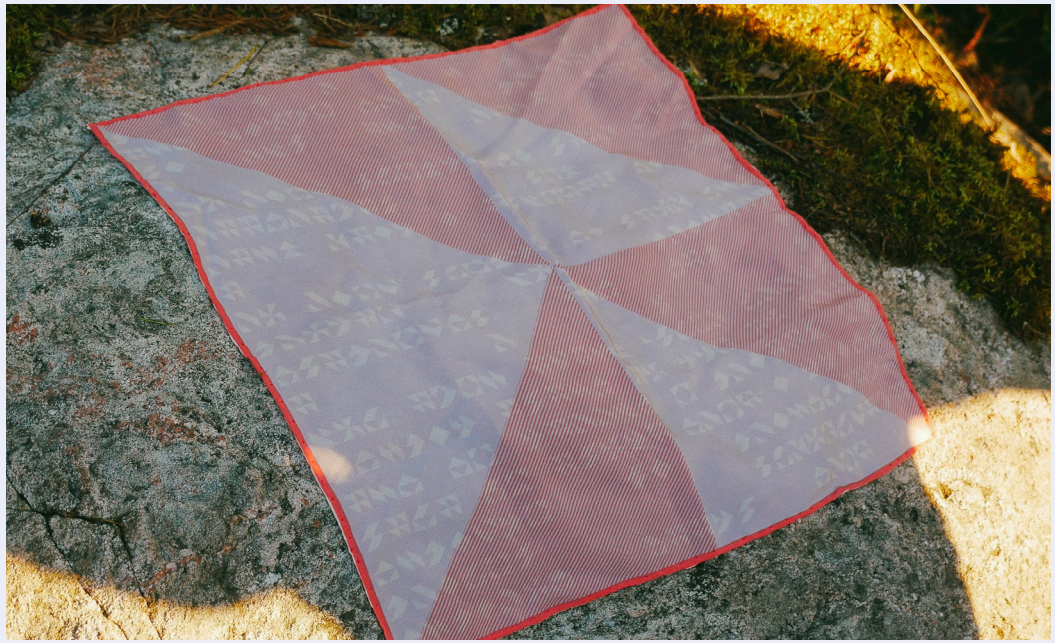
Digital visualisation



Printed silk scarf







Wet Biofibre Spinner

Project video

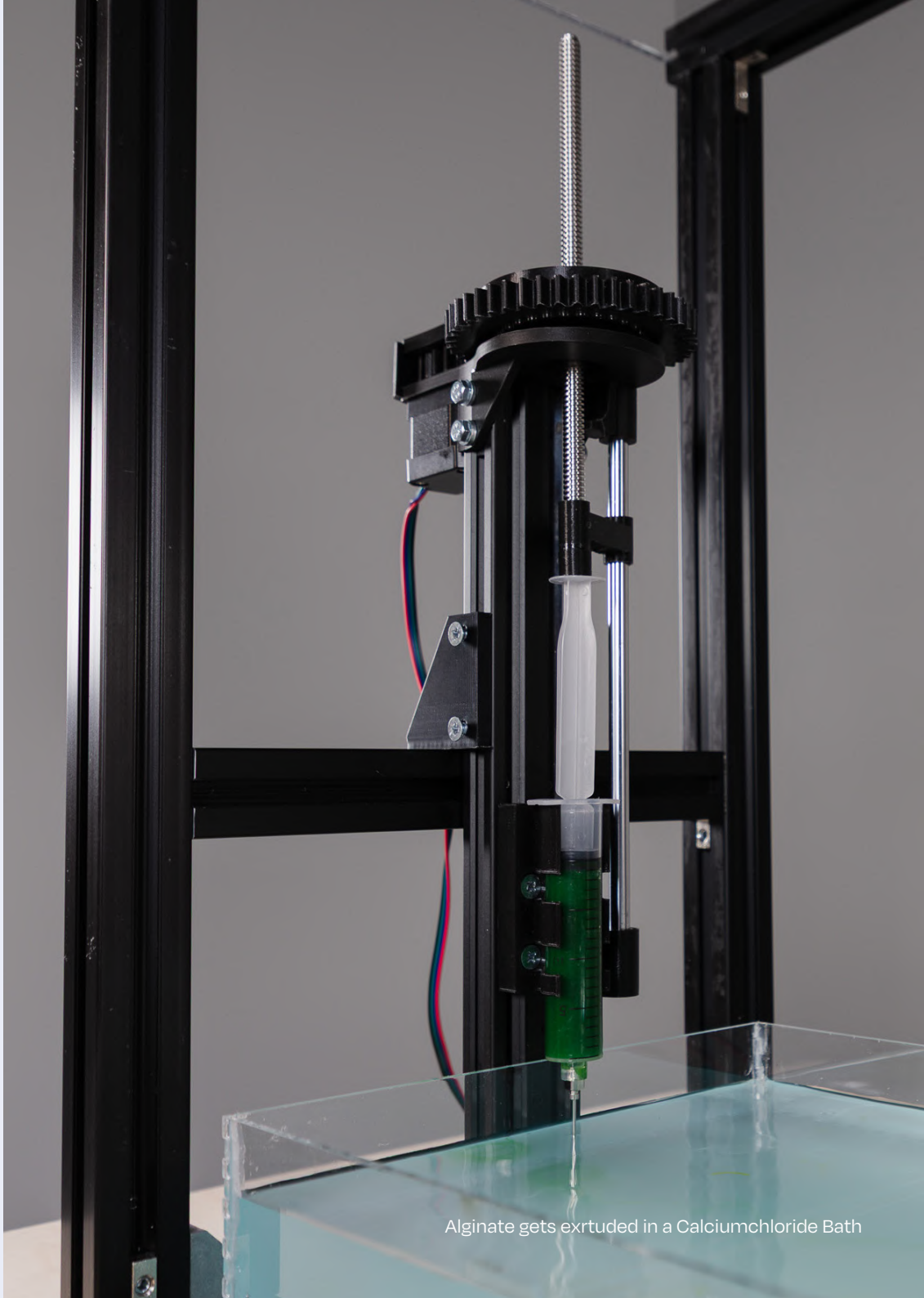
2025, in collaboration with MOME Innovation Center:
Malu Lücking, Ferenc Kovács-Nagy
self initiated project

How can we hack and democratize technologies for open biomaterial innovation?

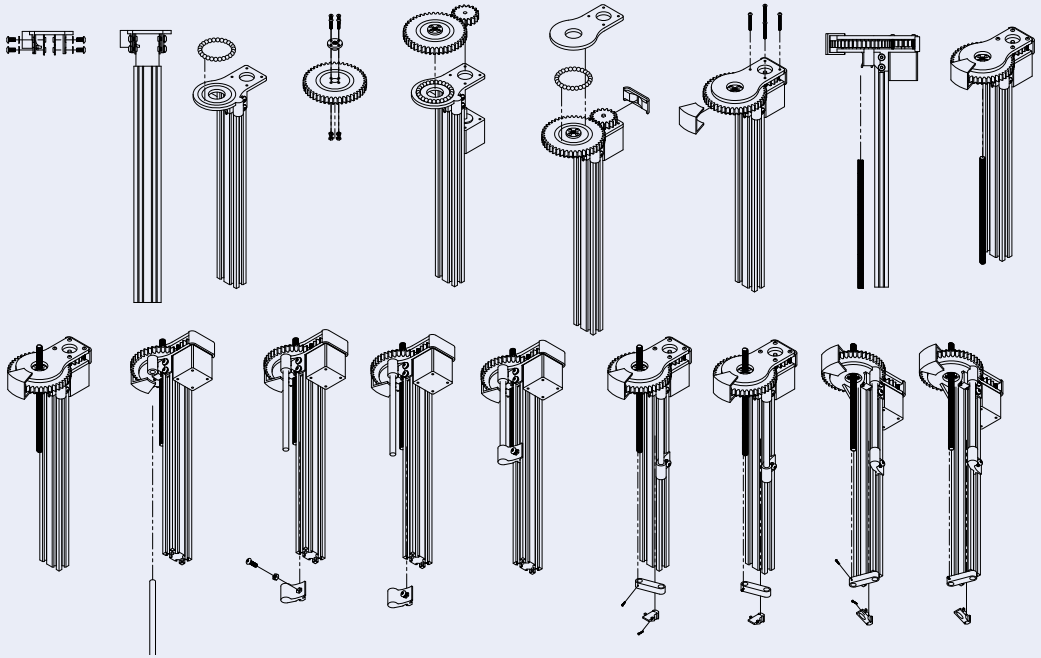
Currently, **35%** of environmental microplastics are derived from synthetic petroleum-based **microfibres**, which are non-biodegradable and thus represent a design flaw. Transitioning from fossil-based to **local**, **renewable resources** is essential to establishing a **regenerative, circular textile industry**.

Experimentation is a key driver of innovation, but **limited access** to material processing **infrastructure** restricts biomaterial development for many designers and changemakers. This project aims to change that by providing **accessible tools** and **resources**.

The wet biofibre spinner is the first **open-source wet spinning machine** for **small-scale bio-based**, **biodegradable fibre production**, that **empowers** designers, researchers, and communities to directly participate in material innovation.



Alginate gets exrtuded in a Calciumchloride Bath



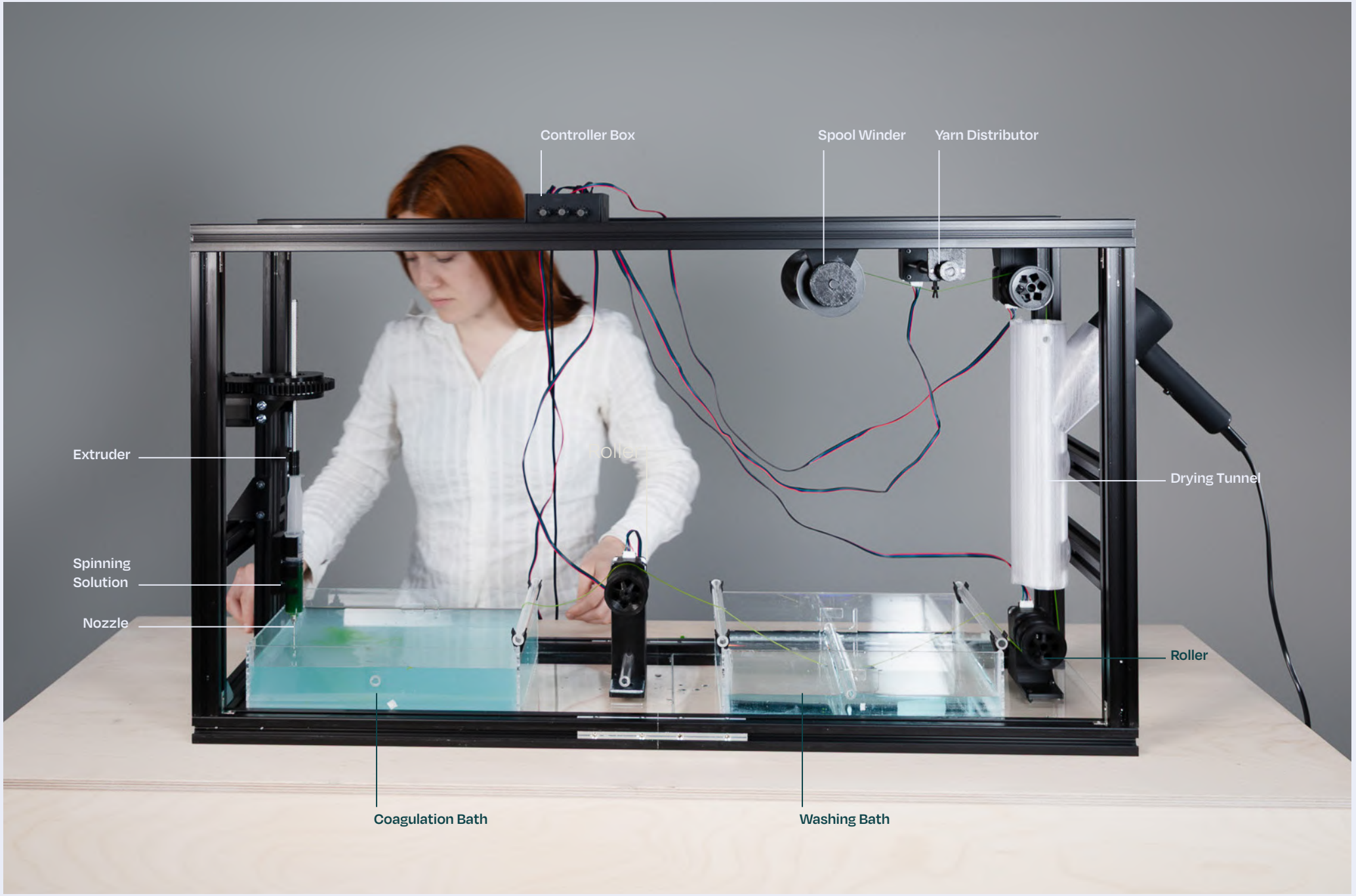
Part of open source hardware is to write and upload a documentation.



Biobased monofilaments produced with the Wet Biofbire Spinner.



Assembling the machine


Controller Box
Spool Winder
Yarn Distributor
Extruder
Drying Tunnel
Spinning Solution
Nozzle
Roller
Coagulation Bath
Washing Bath

Every Fourth Breath

Project video

2024, Aalto University
In Collaboration with Carla Rotenberg, Hitomi Asaka, Aada Teittinen

In this immersive experience, the scales are flipped: **diatoms**, a little-studied microalgae responsible for generating the oxygen in **every fourth breath** we take, are magnified to become **larger-than-humans**. This allows us to encounter these microscopic organisms at eye level, engaging with them through a **speculative yet research-informed narrative** delivered from the diatoms' perspective.

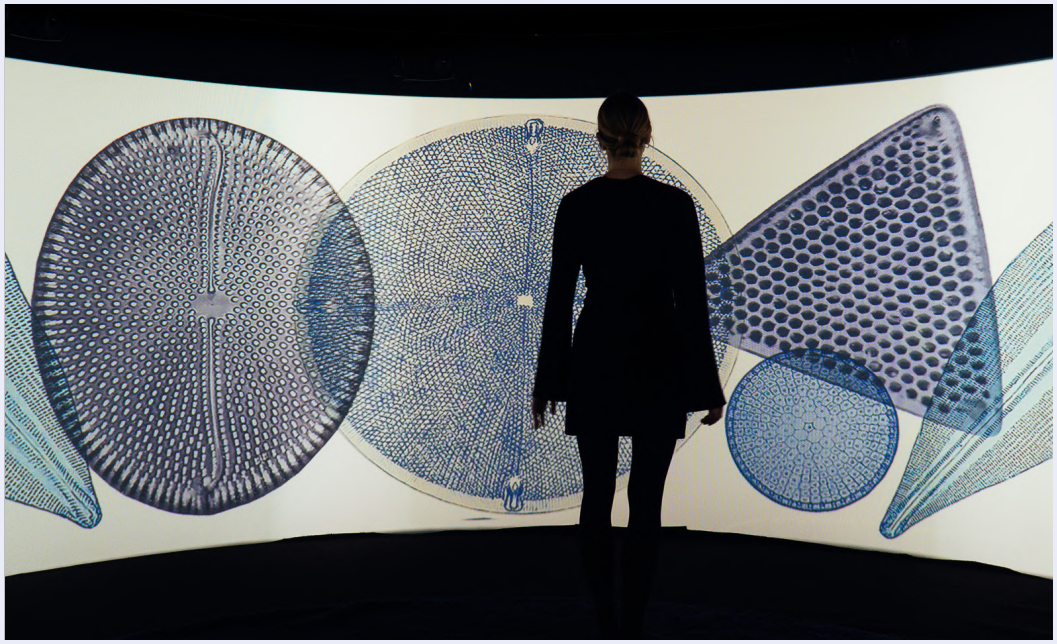
In the **360-degree screening**, humans are invited to witness the incredible diversity, beauty, and power of these normally invisible for human-eyes life forms. The experience incorporates breathing exercises and guided meditation, prompting reflection on the oxygen we consume and the tiny life forms we owe it to.

Designed to **stimulate all the senses**, the installation features **immersive sound** and **video**, tactile interaction with **handmade diatom-shaped cushions**, and even taste. **Diatom-inspired popsicles**, based on the species **Phaeodactylum-Tricornutum** – known for its ability to change in shape in **different water conditions**. The parameters for these different water qualities were translated into **flavour spectrums**, resulting in a **popsicle** that shapeshifts and accordingly **changes taste while eating**.

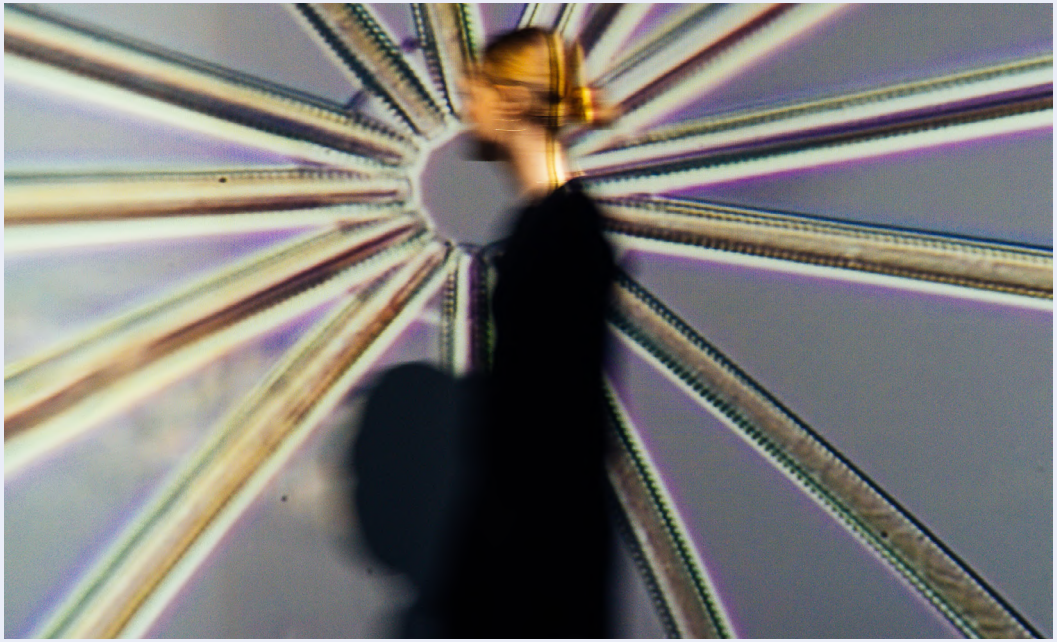




diatom cushions



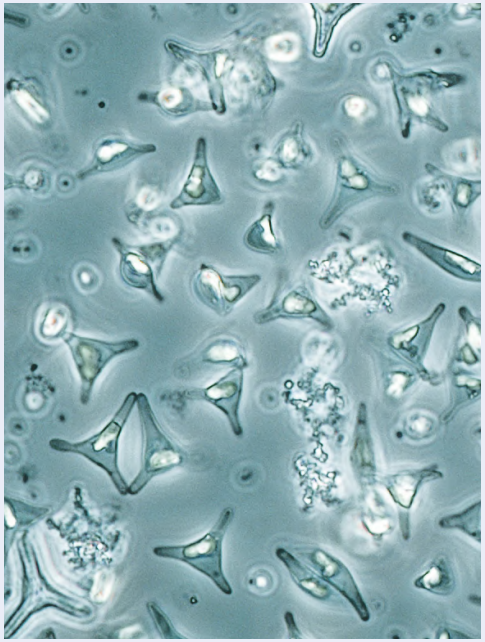
360-degree screening in a 6-meter projecting room



360-degree screening of scaled diatoms



Collecting diatom samples in the Baltic Sea.



Observing Phaeodactylum tricornutum's shape-changing ability under the microscope.



Translation of parameters different water qualities into flavour profiles for each shape.



Diatoms popsicle that changes taste while eating.

Amphyra

Project video

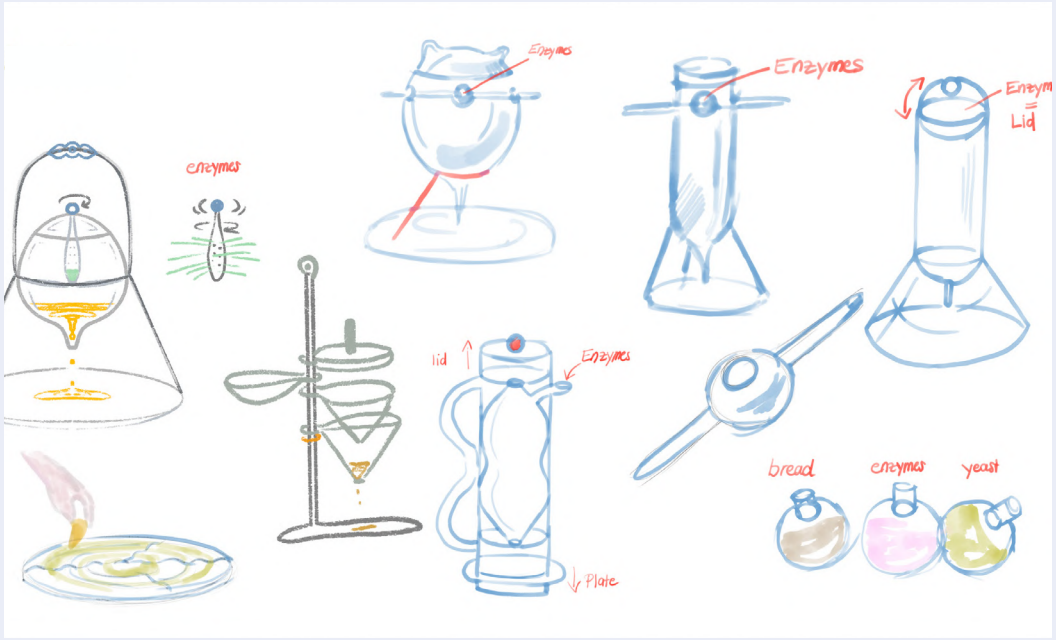
2025, Aalto University
In Collaboration with Carla Rotenberg

How might our food rituals evolve amid climate change, with science while preserving culture and pleasure?

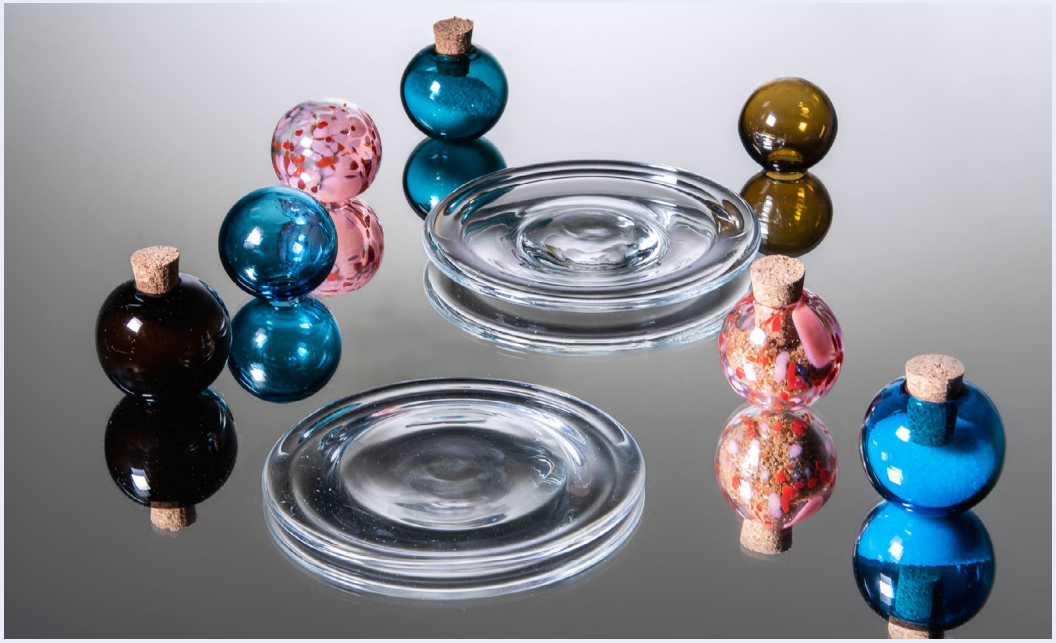
Amphyra is a **speculative product** to **create yeast oil at home**. The name combines the Greek words "Amphora" (ancient oil vessel) and "Myra" (oil). **Olive Oil**, often called **liquid gold**, is highly affected by **climate change**, through droughts and plagues, leading to fraught by adulteration. Yet these kind of **healthy fats** remain essential to our diet. Scientists are creating energy-friendly alternatives using a **fermentation process** with **yeast** (Trichosporon oleaginosus), which is fed with **bread waste**, and **enzymes**, which **extract** the **produced lipids**. Through **centrifuging**, the oil is separated from the remaining liquid, requiring **no additional energy nor toxic chemicals**.

In a soon-to-be future, this oil production would be possible at home: Amphyra uses **glass** for its **scientific properties** and its **cultural use** in **tableware**. The main vessel shape meets scientific needs while evoking ancient oil production. A gentle push starts the structure spinning, mixing the ingredients and centrifuging the liquids, **creating oil within one vessel**. The different **glass spheres** portion, store and color-code the **ingredients**, serving simultaneously as **lids**. Rippled blown **glass plates** have been designed to **harvest the oil** and provide a pleasant dipping for the diners. In this way we hope to unite **future food** production with **familiarity**, **craft** and **community**.





Form-finding sketches of an object that includes all biotechnological steps of yeast oil production.



The spheres store ingredients for the biotechnological process.



Process of glass blowing Amphyra in collaboration with glass blowers.



A future scenario how we consume the future yeast oil at home.

Seabombs

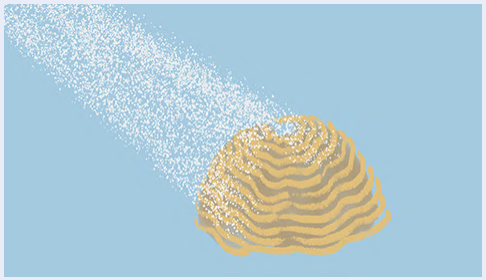
2025, Aalto University
Concept Development in Collaboration with Malu Lücking

How can 3D-printed stoneware structures support the restoration of coastal seaweed gardens?

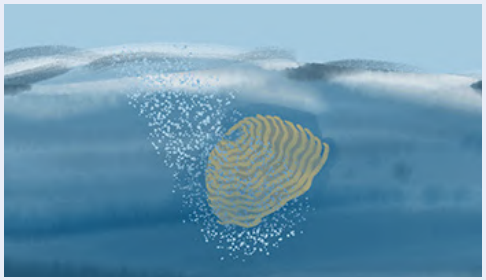
Seaweed forests are **critical ecosystems**: they act as major carbon sinks, regulate oceanic biodiversity, and sustain marine food webs. Yet, due to rising ocean temperatures, pollution, and agricultural runoff leading to eutrophication, these underwater habitats are rapidly declining. This project investigates how low-tech, biodegradable ceramic structures can serve as scaffolding for new seaweed growth. **Seabombs** are **hand-sized**, **3D-printed domes** made from **local clay**. Their porous, textured surfaces feature **geometrical pockets** designed to hold **seaweed spores**, which are cultivated in marine nurseries before being introduced into the wild. They can be deployed in two ways: thrown into the ocean to sink naturally or strung vertically on ropes to optimize sunlight exposure. These forms mimic natural rock substrates, giving seaweed the anchorage it needs to thrive. Fired at low temperatures, the clay structures will gradually erode and **reintegrate into the mineral cycle** after their ecological role is fulfilled.

Community involvement is a central component. Local residents are invited to participate in all phases – from digging native clay and printing the forms using simple, site-specific clay printers, to pit firing and releasing the Seabombs into the sea. Their size is intentionally ergonomic, allowing each person to craft and contribute a single Seabomb – making **coastal restoration** tangible, personal, and collective.





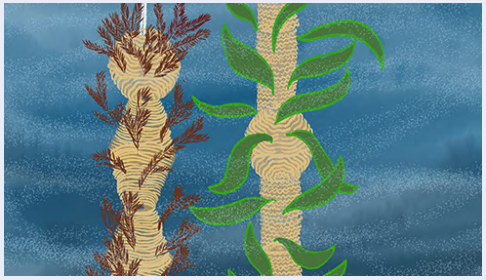
Seeding the spores in the marine nurserie



Releasing Seabombs into the ocean



Let the seaweed thrive

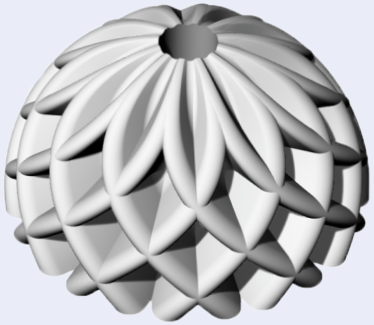


Strung Seabombs vertically on ropes to optimize sunlight exposure.





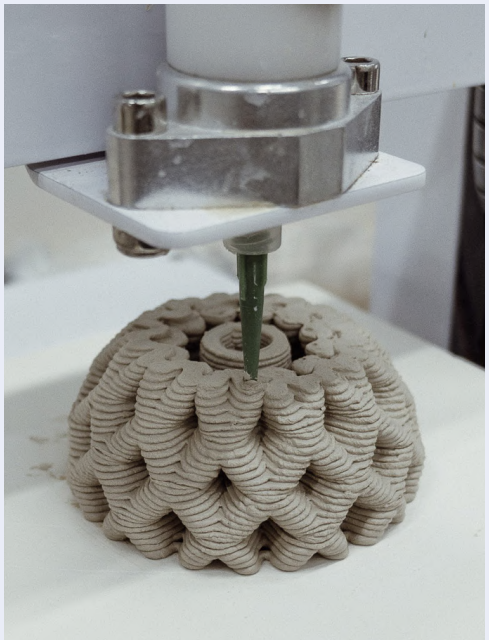
Exemplary manufacturing process



3D model



Sliced model



Printing with clay



fired Seabomb

BarkSkin

Project videos

2026, Aalto University
In Collaboration with the Fibre Spinning Team,
Department of Bioproducts and Biosystems
Master Thesis

Can tree bark inspire the next generation of water-repellent textile fibres?

We seek nature for movement, recovery, and well-being, yet we experience it wrapped in fossil-based synthetic textiles. While **modern activewear** provides **outstanding performance** through properties such as quick-drying, water repellency, durability, and low weight, it continuously releases **microplastics** during wear and washing. In contrast, bio-based fibres such as regenerated cellulosic fibres are renewable and biodegradable but lack the intrinsic **hydrophobicity** required for many functional textile applications.

Inspired by tree bark as a living protective skin, BarkSkin investigates whether tree-derived **tannins** can impart hydrophobicity to regenerated cellulose fibres. Developed at the intersection of fibre engineering and design, the project proposes a bio-based, biodegradable, and circular alternative to synthetic functional fibres. Structured around the triad of **Activism**, **Actuation**, and **Activities**, the project moves from environmental urgency (Why), through material research and development (What and How), to future applications for regenerative activewear (What for).

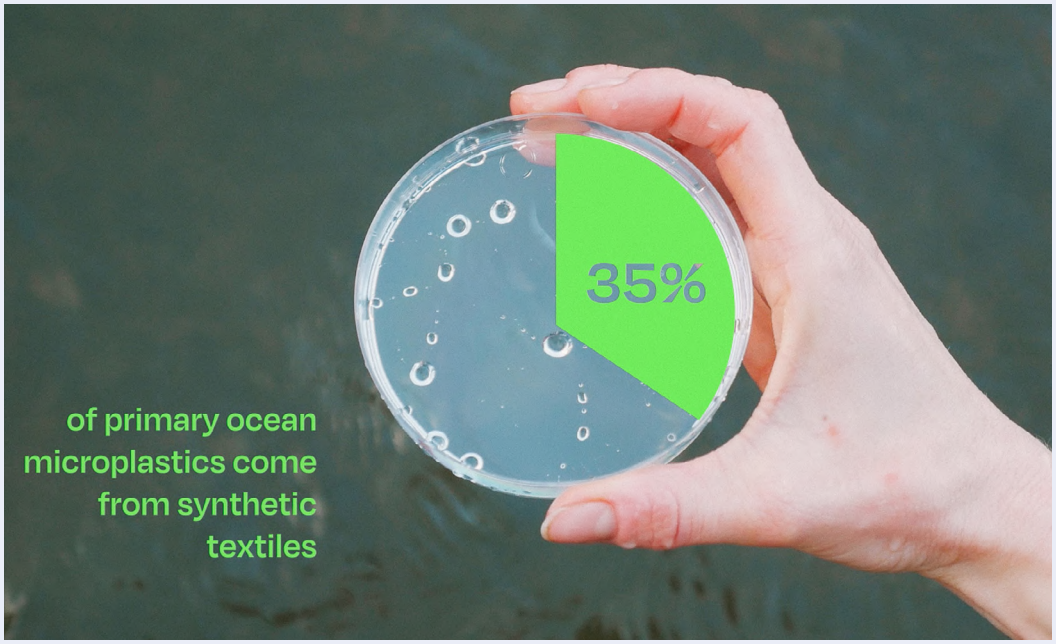
The research culminates in a three-channel **immersive film installation**, with each film representing one part of this narrative. Together, they guide the viewer from the environmental challenges associated with contemporary performance textiles, through the material innovation process, and finally toward a speculative vision of future activewear applications.



Activism (Why)

Activism introduces the environmental motivation behind BarkSkin. Through atmospheric footage of running in Finnish forests, the film questions our relationship with nature while wearing fossil-based synthetic activewear and ends with the speculative question that sparked the project: What if we built textile fibres inspired by bark?





Textiles' contribution to ocean microplastic pollution



microplastic accumulation in the human body



Wood chips



Tree bark



Ionic Liquid



Cellulose Pulp



Tannin



Spinning dope



Pre-yarn



Plied yarn

Actuation (What and How)

Actuation visualises the material innovation process, guiding the viewer from spinning dope preparation and fibre spinning to yarn production, textile manufacturing, and hydrophobicity testing. By documenting each stage of development, the film makes the often invisible process of fibre development accessible beyond the laboratory.



Scaling up the fibre spinning process.



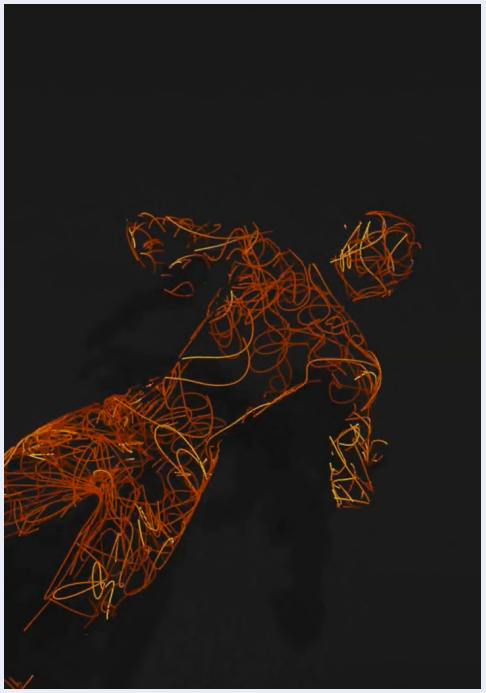
BarkSkin yarn

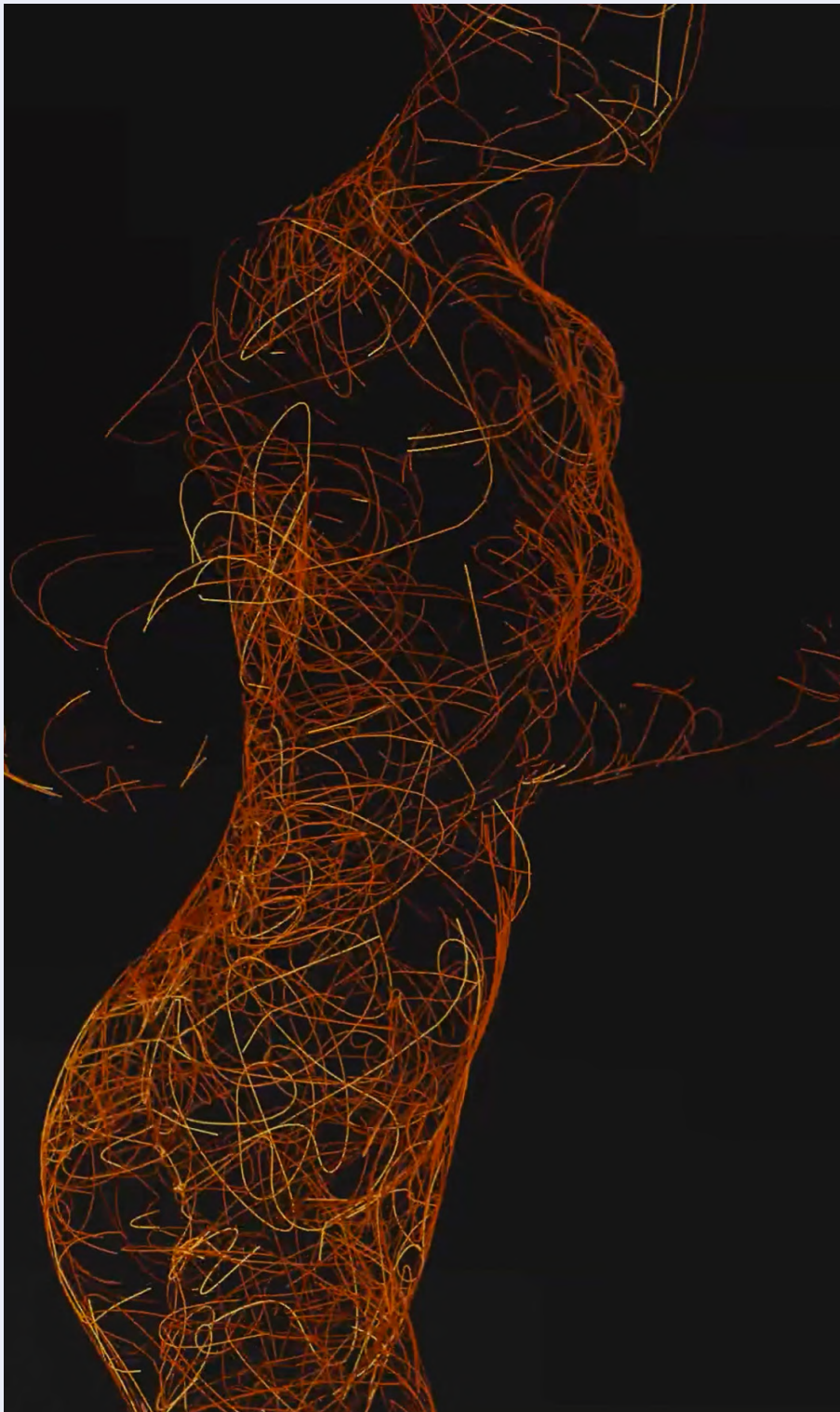


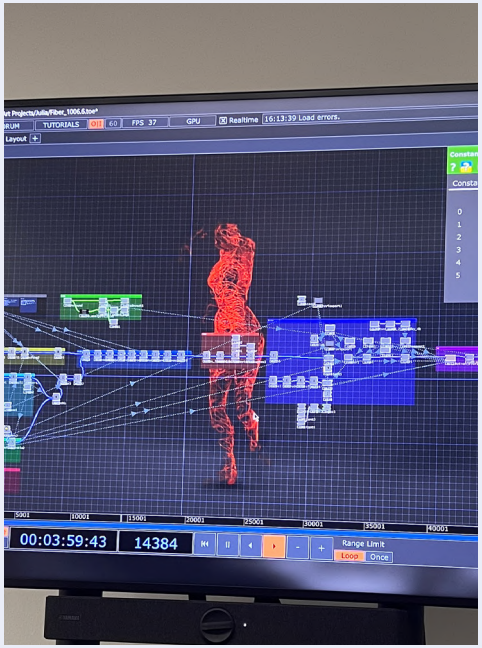
Textile creation

Activities (What for)

Activities envisions a possible future for BarkSkin. Instead of illustrating a finished product, the material itself becomes the central protagonist. A figure composed of BarkSkin fibres performs a choreography of different sports. The film concludes with the garment transforming into a tree before returning to the human body, symbolising the continuous cycle between biological resources, materials, use, and biodegradation. The animation was brought to life in collaboration with Touch Designers Julia Zambrzycki and Calvin Suarez.







Creating the Animation in TouchDesigner



Illustrations

all Illustrations

2019-today
self generated and commissioned Projects

As an illustrator, I love to surprise myself and explore all aspects of the human being with humor, lightness, and a strong emphasis on color.












THANK YOU!