

# (UN)ROOTED

AN INTERACTIVE INSTALLATION  
EXPLORING BELONGING, GROWTH &  
CONNECTION

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BOOKLET  
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waag  futurelab

 FABRICADEMY  
textile and technology academy

# CONCEPT

an installation to reconnect with our roots

Unrooted is an interactive art installation that explores the contemporary meaning of rootedness and belonging in an age of mobility, digital interconnection, and shifting identities. The work creates a sensory and reflective space where visitors can physically and emotionally explore what it means to feel grounded.

Through a combination of organic materials, participatory processes, and interactive technology, the installation makes visible and tangible the ways people connect—to places, to others, and to themselves.



*Click [here](#) for the installation video*









# BACKGROUND

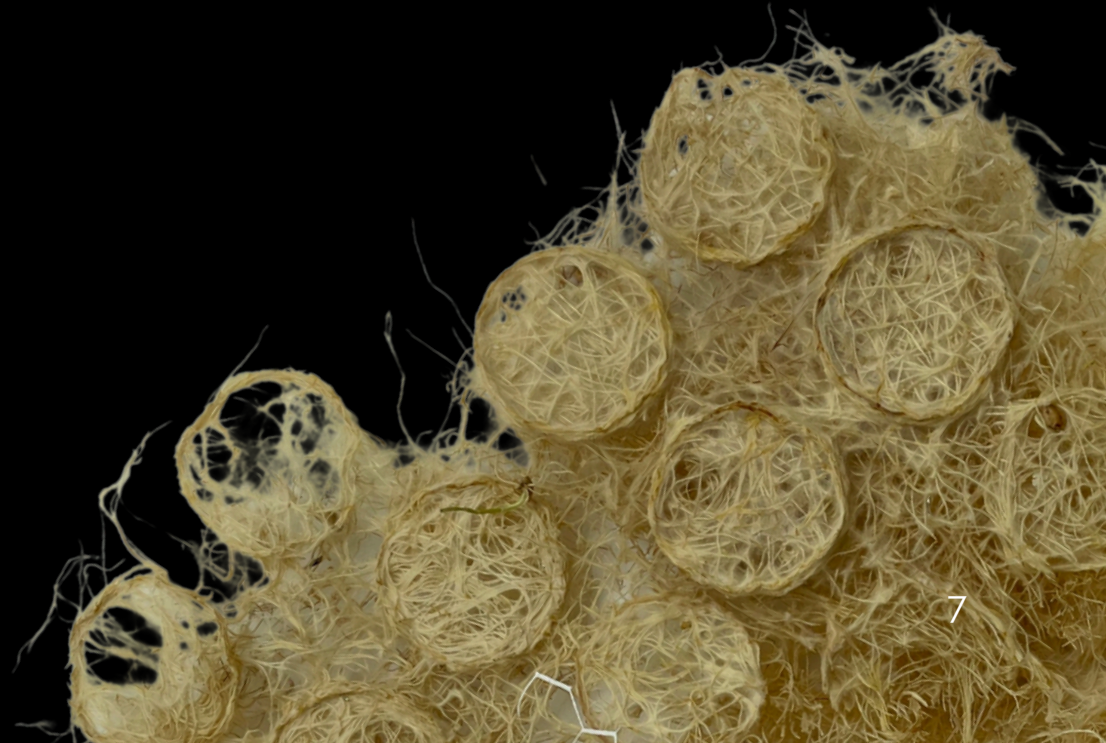
In a time of constant change, where living environments, identities, and social reference points are continuously shifting, the question of rootedness becomes increasingly relevant. High mobility, frequent relocation, and digital mediation can create both new forms of connection and a growing sense of displacement.

The project emerges from the artist's personal experience of feeling both connected and unrooted — of belonging everywhere and nowhere at the same time. From this tension arises the central question: How do we root ourselves in motion?

Rootedness in this project is not understood as a fixed state tied to geography, but as an evolving process formed through interaction, shared experiences, and emotional presence.

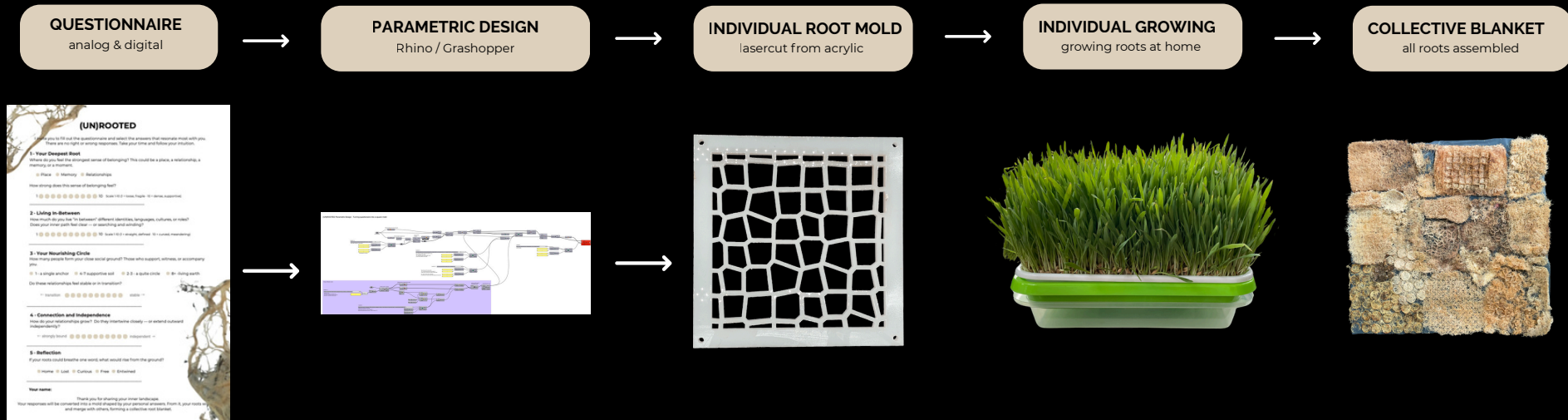
## how do we root ourselves in motion?

Between belonging and alienation, movement and stillness, Unrooted creates a space to explore the nuances of arrival, foreignness, and connection.



# THE MAKING OF UNROOTED

a collective process



The installation is created through the participation of many individuals. Each participant begins by completing a **questionnaire**, reflecting on questions such as where they feel the strongest sense of belonging, and how intense this feeling currently is, rated on a scale from 1 to 10.

These responses are translated into a **parametric design** that shifts and adapts according to each answer. A stronger sense of belonging results in thicker, more pronounced root paths, while weaker connections form thinner, more fragile structures.

From this design, a **custom laser-cut mold** is produced for every participant.

Alongside the mold, participants receive a small **growing kit** containing seeds—cat grass and barley—as well as instructions for cultivation.

Over a period of approximately ten days, **participants grow the plants** within the mold. As the seeds germinate, the roots follow the predefined paths, gradually forming organic structures shaped by the parametric system

Once the growing period is complete, participants return their pieces to the artist.

These individual works are then assembled into a larger, textile-like surface, resembling a **quilt blanket of interconnected roots**. The artist also contributes her own cultivated piece to this collective composition.



*Click [here](#) for the making of video*

# QUESTIONNAIRE

## Analog

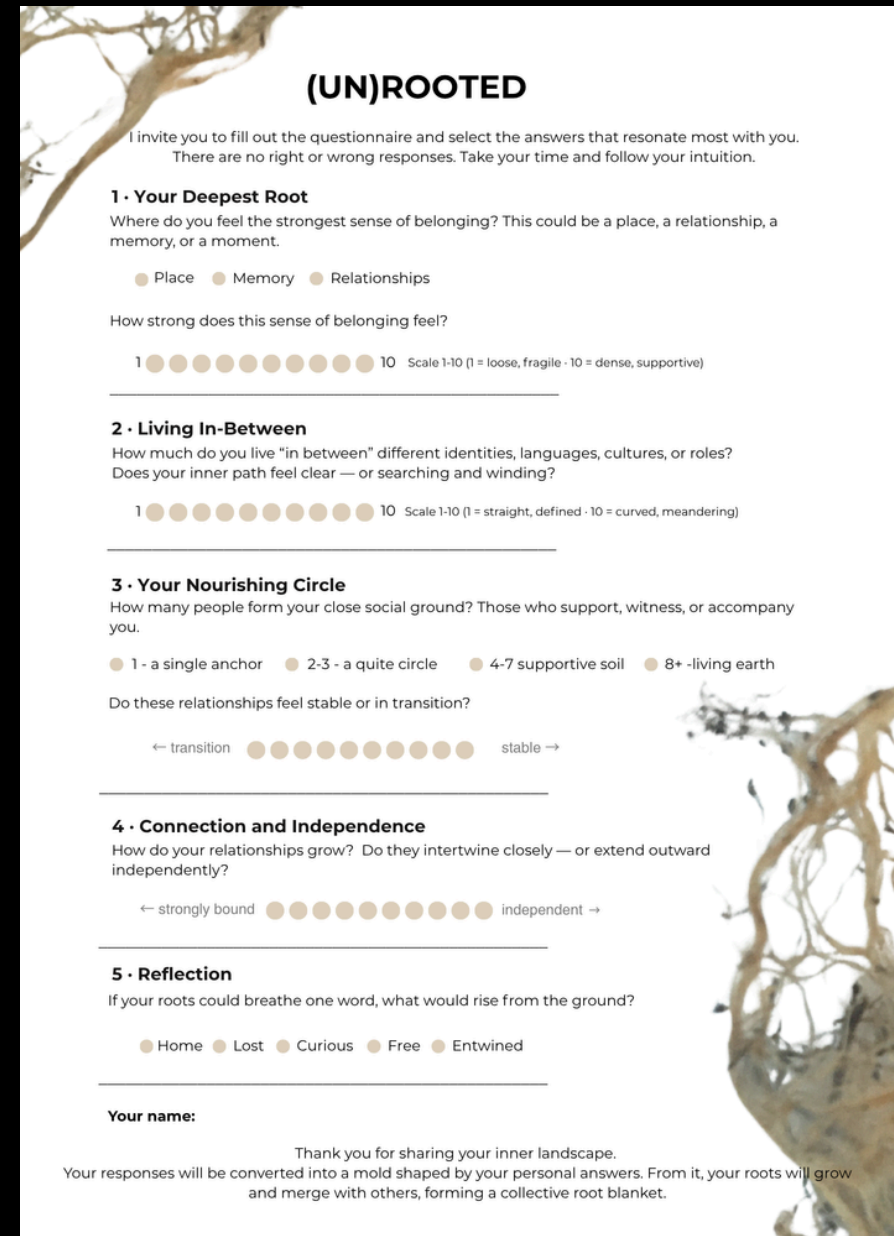
On the right you can see the analog questionnaire.

## Digital

A web application allows people from anywhere in the world to participate in the project. By answering the questionnaire online, users can instantly generate their personal parametric mold design and download the file.



Click [here](#) or scan the QR-code to create your individual mold



**(UN)ROOTED**

I invite you to fill out the questionnaire and select the answers that resonate most with you. There are no right or wrong responses. Take your time and follow your intuition.

**1 • Your Deepest Root**  
Where do you feel the strongest sense of belonging? This could be a place, a relationship, a memory, or a moment.

Place  Memory  Relationships

How strong does this sense of belonging feel?

1 ●●●●●●●●●● 10 Scale 1-10 (1 = loose, fragile · 10 = dense, supportive)

**2 • Living In-Between**  
How much do you live "in between" different identities, languages, cultures, or roles? Does your inner path feel clear — or searching and winding?

1 ●●●●●●●●●● 10 Scale 1-10 (1 = straight, defined · 10 = curved, meandering)

**3 • Your Nourishing Circle**  
How many people form your close social ground? Those who support, witness, or accompany you.

1 - a single anchor  2-3 - a quite circle  4-7 supportive soil  8+ -living earth

Do these relationships feel stable or in transition?

← transition ●●●●●●●●●● stable →

**4 • Connection and Independence**  
How do your relationships grow? Do they intertwine closely — or extend outward independently?

← strongly bound ●●●●●●●●●● independent →

**5 • Reflection**  
If your roots could breathe one word, what would rise from the ground?

Home  Lost  Curious  Free  Entwined

**Your name:**

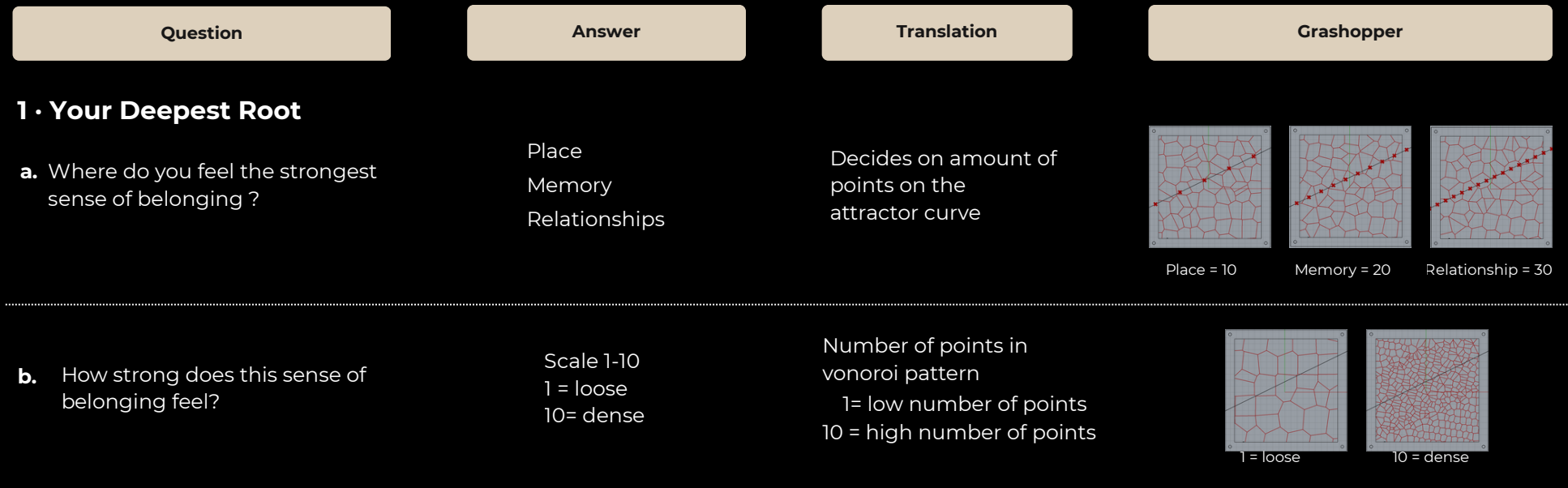
Thank you for sharing your inner landscape.  
Your responses will be converted into a mold shaped by your personal answers. From it, your roots will grow and merge with others, forming a collective root blanket.

# PARAMETRIC DESIGN

## questionnaire turned into design

The first step involved determining which parameters from the questionnaire would correspond to specific aspects of the design within Rhino. Voronoi cells were selected as the primary design system, as

they allow for the integration of multiple variables within a single structure. This approach provided a flexible framework to translate qualitative responses into spatial and formal variations.

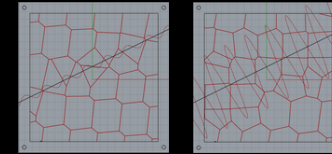


## 2 · Living In-Between

How much do you live “in between” different identities, languages, cultures, or roles.  
Does your inner path feel clear — or searching and winding?

Scale 1-10  
1 = clear  
10= winding

Influences attractor curve  
→ straight or winding  
1= straight  
10= strongly curved



1 = clear      10 = winding

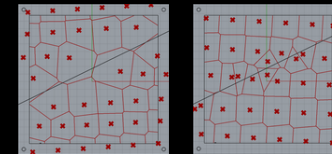
## 3 · Your Nourishing Circle

a. How many people form your close social ground?

1 - a single anchor  
2-3 - a quite circle  
4-7 supportive soil  
8+ -living earth

Distance of voronoi center points to attractor curve

1 = points are further away from attractor curve = cells are bigger in the center  
8 = points are closer to the attractor curve = voronoi cells smaller in the center



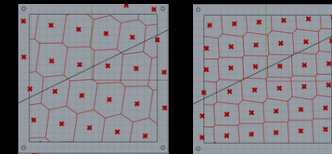
1 - a single anchor      8+ -living earth

b. Do these relationships feel stable or in transition?

Scale 1-10  
1 = in transition  
10= stable

Distance between voronoi center points = size

1= high distance between cells  
10= low distance



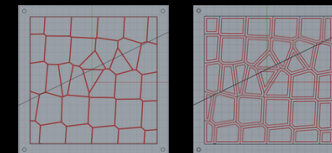
1 = in transition      10 = stable

## 4 · Connection and Independence

How do your relationships grow? Do they intertwine closely — or extend outward independently?

Scale 1-10  
1 = independent  
10= strongly bound

thickness of voronoi cell walls  
1= thin voronoi walls  
10= thick voronoi wall



1 = independent      10 = strongly bound

## 5 · Reflection

If your roots could breathe one word, what would rise from the ground?

Home      Entwined  
Lost      Curious  
Free

type of seed participants receive

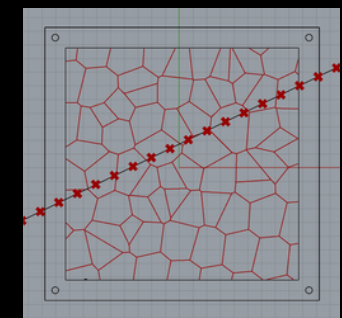
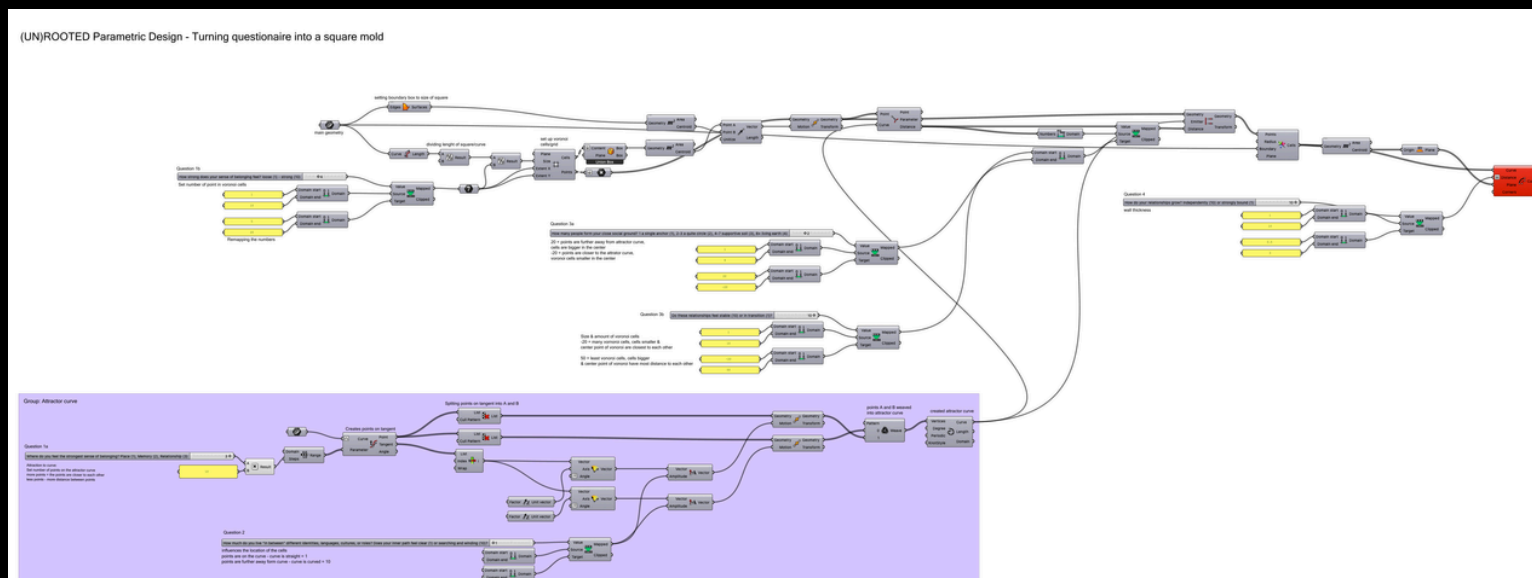
wheat → Home, entwined  
barley → Lost, Free, Curious  
(no grasshopper parameter)

# GRASSHOPPER

To construct the design framework, a rectangle of 20 x 20 cm was first created in the software Rhino to serve as reference geometry. This shape was then defined as a bounding box, ensuring that all subsequent transformations and variations remained contained within fixed boundaries. This method provided consistency and clarity across all modules.

## technical implementation

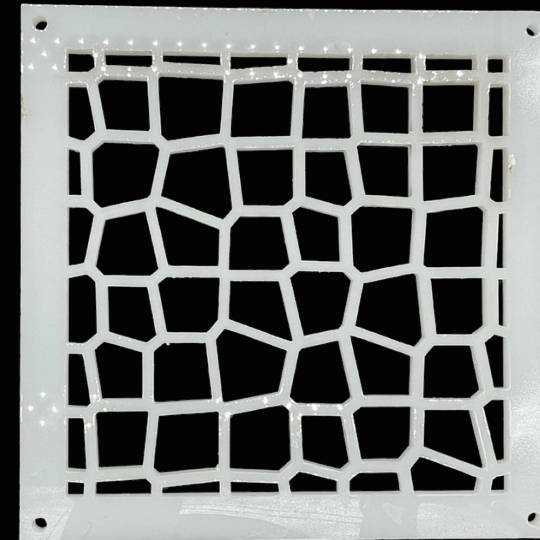
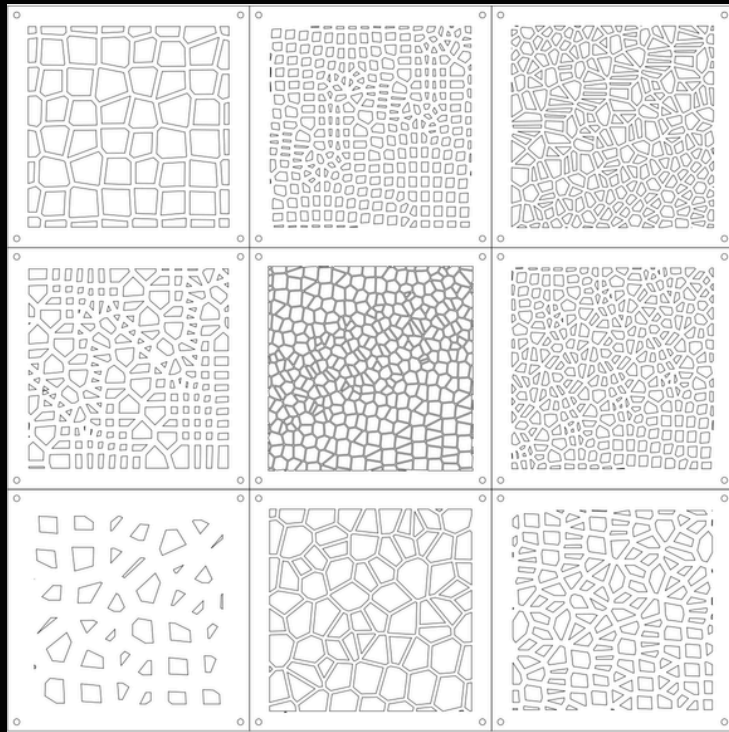
Within the application Grasshopper, each question from the questionnaire was assigned to a corresponding slider. These sliders controlled specific design parameters, allowing the input values to directly influence the geometric outcomes. In this way, participant responses were systematically translated into variations within the overall design



# INDIVIDUAL MOLDES

The collection of participant molds reveals how each individual responds uniquely to the questionnaire, resulting in distinct, personalized designs. In the next step, these

patterns are laser-cut from acrylic sheets and carefully assembled into complete molds. The roots then grow into the shape of each mold, embodying the individuality of every design.



20 x 20 cm

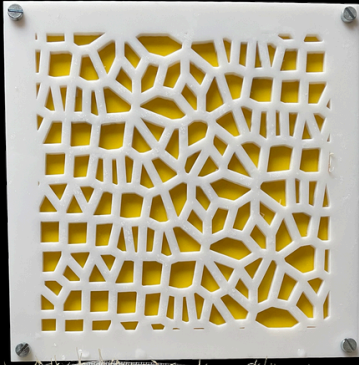
# BUILDING MOLDES

From lasercut pieces to the fully assembled moldes.

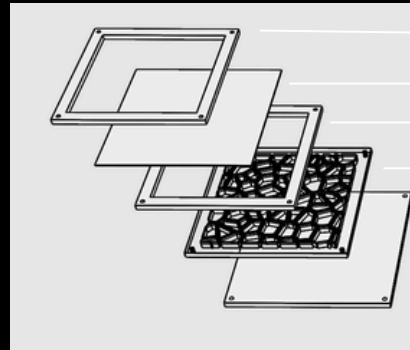


# LASER CUT MOLD *negative pattern*

Mold Nr. 1



Set-up



frame - 5mm - wood  
net - tull fabric  
frame - 5mm - acrylic  
pattern - 7 mm - acrylic  
base layer - 7 mm - acrylic

Laser cutter settings:  
Speed: 10 / Power: 75

Growing result



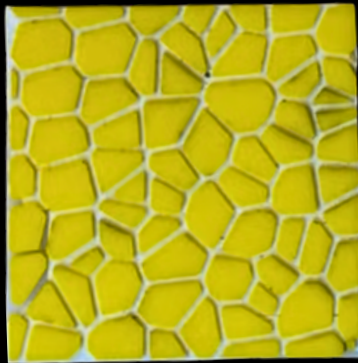
## Observation & Improvement

- first frame layer → wood got moldy = better using acrylic
- tull fabric difficult to cut - beaks easily → aluminum net works much better
- rectangle shape is not totally suitable - roots grew only in the middel part, not in the corners unless they are spead wider then the boarders of the mold
- A lid with min. 10 cm ins needed for keeping seeds moist and ventilated
- roots were growing underneath the parametric pattern, even when screwed tightly → gluing pattern layer fully onto base layer or 3D printing instead
- the frame on top of the pattern layer serves to keep a distance between the net and the pattern, so roots first intertwine and then grow down

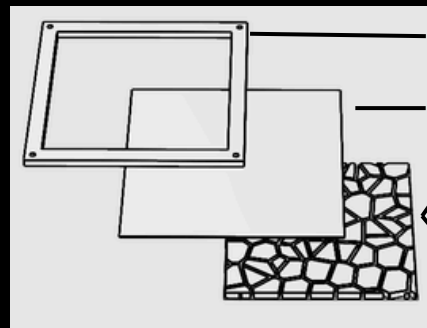
# LASER CUT MOLD *positive pattern*

To minimize waste, the leftover pieces from mold nr. 1 were glued onto an acrylic sheet, creating a positive mold.

Mold Nr. 2



Set-up



frame - 5mm - acrylic

net - aluminium

pattern - 7 mm - acrylic

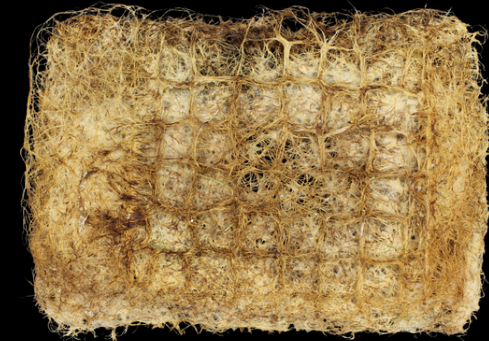
glued with double sided tape

base layer - 7 mm - acrylic

Laser cutter settings:

Speed: 10 / Power: 75

Growing result



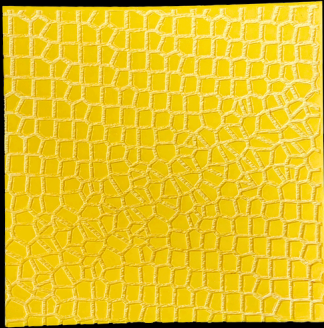
## Observation & Improvement

- roots can not grow underneath the pattern → works very well
- the patten has to be glued onto the base layer which is difficult. I tried to glue it with doublesided tape → not stable enough. Roots grow around the acrylic pieces so they ripped off by taking out the roots of the mold. Acrylic glue could be an option but unsustainable or putting strong double sided take before laser cutting
- this size of pattern works well, too small doesn't work

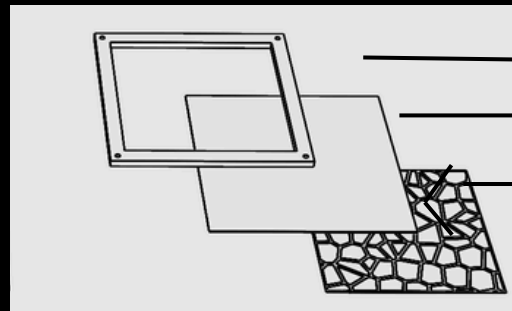
# LASER ENGRAVED MOLD

Another type of mold is this 5 mm engraved acrylic sheet

Mold Nr.3



Set-up



frame - 5mm - acrylic

net - aluminium

pattern 0,5 mm engraved  
3mm acrylic

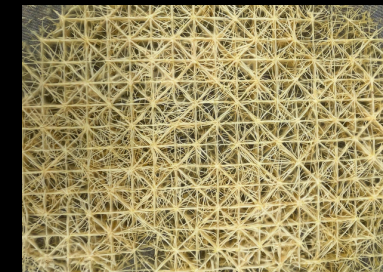
Laser cutter settings:  
Speed: 300 / Power: 100

Growing result



## Observation & Improvement

- One result letting roots grow on a piece of a bought engraved fabrics worked very well, so I used same depth of engraving on my moldes, unfortunately the root structure did not turn out as strong as on the fabric
- The engraved parts might need to be smaller
- Engraving with a laser cutter takes very long



result grew on engraved fabric

# SEEDS

Both wheatgrass and barley were tested and proved suitable for the process. However, wheatgrass performed slightly better due to its

faster germination rate and lower cost. Based on these observations, wheatgrass is recommended.

## WHEAT GRASS

*Triticum aestivum*



## BARLEY

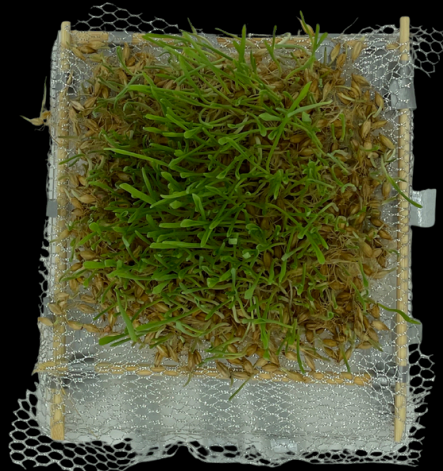
*Hordeum vulgare*



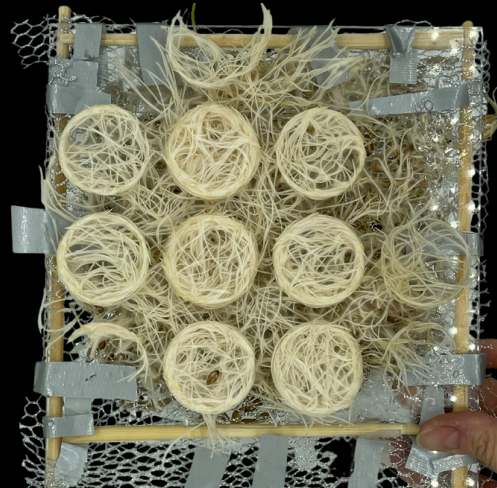
# GROWING PROCESS



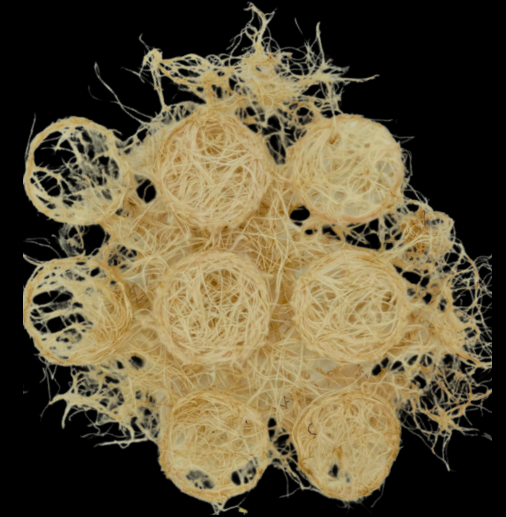
3 days



10 days - front

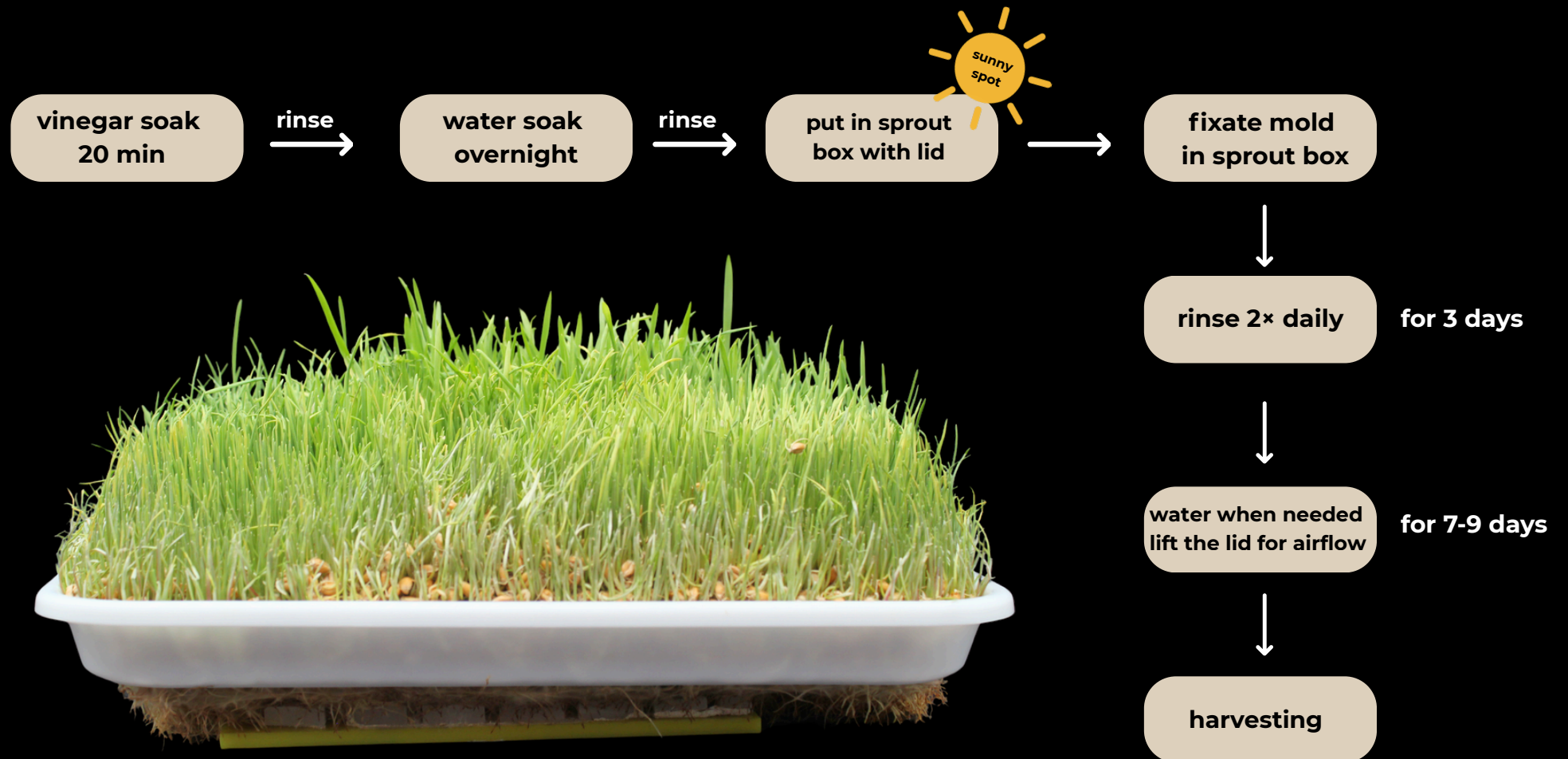


10 days - back



dried

# HOW TO GROW ROOTS



# GROWING

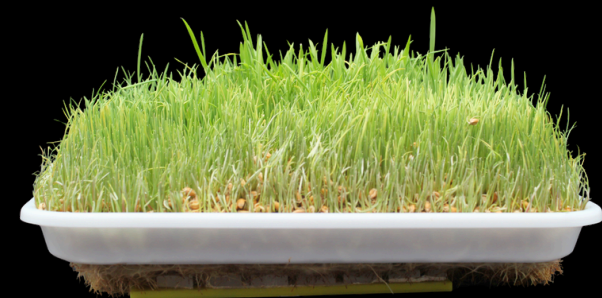
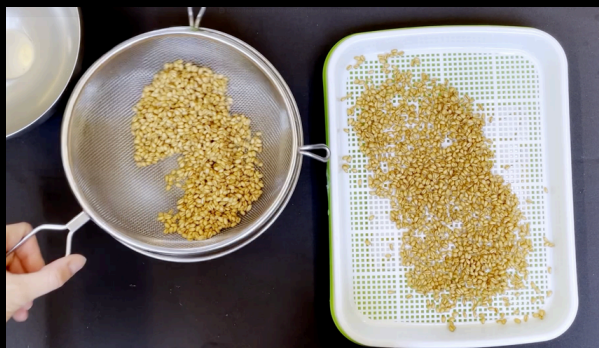
## step 1

The seeds are first soaked in vinegar for 20 minutes, then rinsed and subsequently soaked in water for approximately 8 hours or overnight.

They are then placed in a sprouting container with a transparent lid, which helps maintain moisture while still allowing airflow due to a gap of about 10 cm between the seeds and the lid.

The container should be positioned in a well-lit area, such as a windowsill. The seeds typically begin to sprout within 2–3 days and should be rinsed twice daily during this period.

Once sprouting has occurred, the seeds are transferred into the molds. To maintain adequate moisture, they should be watered as needed

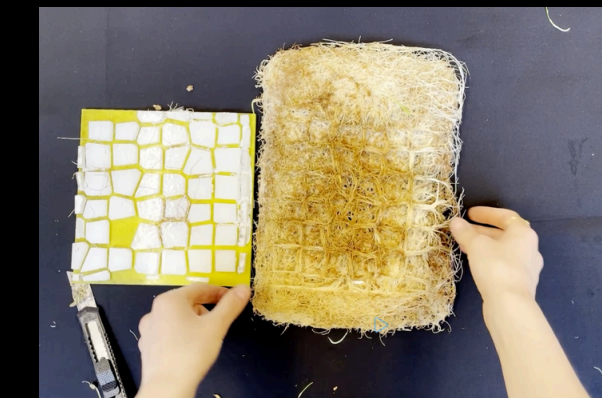
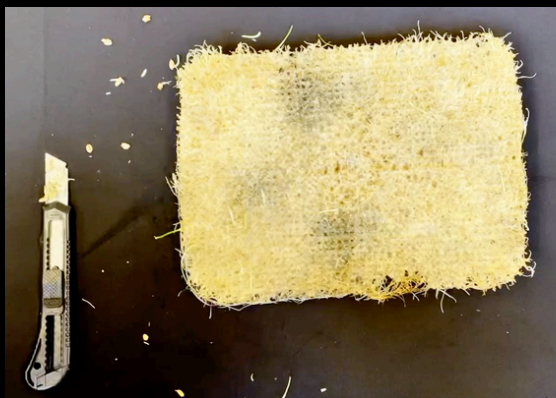


# HARVESTING

## step 2

The roots are harvested once they reach sufficient length. Seeds and grass are removed with a knife to separate them from the roots.

The grown roots are underneath the white sieve. The individual molds has to be taken off in the next step.



# DRYING

## step 3

After harvesting the roots are air-dried for approximately two days or placed in a dehydrator to speed up the process.



# ASSEMBLING

## step 4

Afterwards they are assembled and sewn by hand onto a mesh fabric to provide support and connect the pieces into a single blanket.



# PRACTICAL TIPPS

## Light

Place the setup in a sunny location, as natural light provides the most effective growing conditions. Artificial light can be used as a supplement if needed.

## Watering

Water the seeds daily during the first three days to prevent them from drying out during the critical germination phase.

## Ventilation

If using a sprout box, monitor moisture and airflow once germination begins. As the grass becomes visible, occasional ventilation may be necessary to prevent excess humidity and mold formation.



## Seed Distribution

As seeds tend to grow less densely along the edges, distribute them slightly beyond the borders of the mold to achieve more even coverage

## Enclosure

Choose a mold that fits inside a growing box with a lid, allowing for approximately 10 cm of vertical space. A closed environment helps maintain stable humidity and supports consistent growth.

## Base

Ensure the mold has a solid, well-sealed base to prevent roots from growing downward instead of following the intended contours

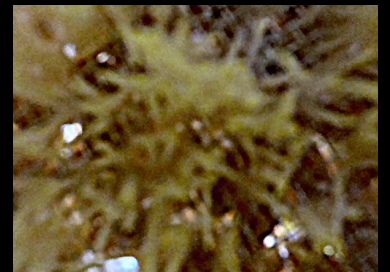
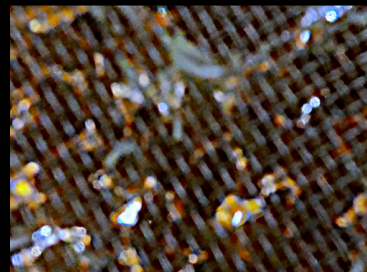
# RESULTS





# PROJECTION

For the projection, the seeds were recorded throughout their growth and edited into a time-lapse video. This video is projected onto a black screen during the exhibition.

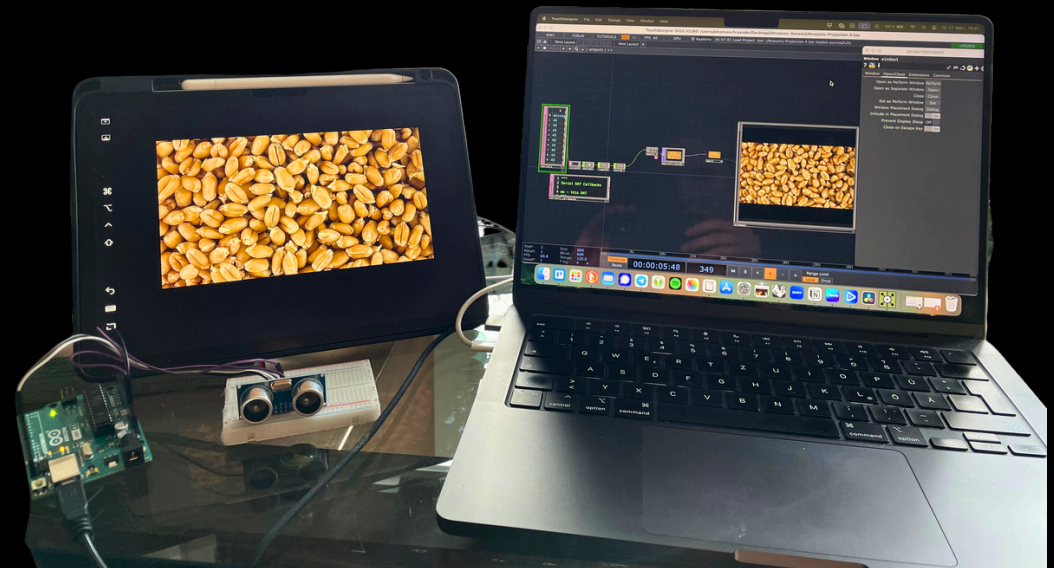
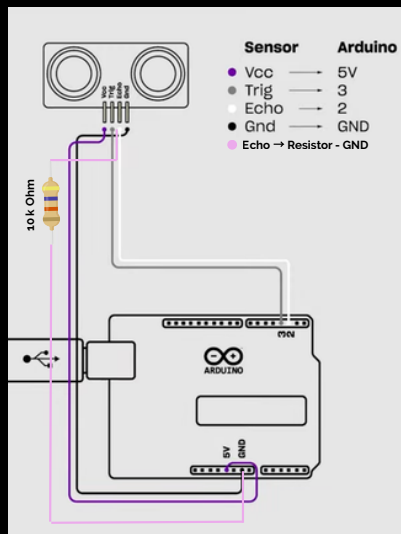


# SENSOR INTERACTION

For the roots blanket, a proximity-based interaction was developed to activate a video projection when a viewer approaches the work. Equipment used are Arduino Uno, ultrasonic sensor, 10k $\Omega$  resistor, and connecting wires. The ultrasonic sensor is connected to the Arduino Uno and measures the distance between the installation and the viewer's hand

or body. This data is transmitted to TouchDesigner, where it is used to control the projection.

When a viewer approaches the roots, the sensor detects the reduced distance and triggers the video projection. When no presence is detected, the projection remains inactive.





# CREDITS

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SPECIAL THANKS TO ALL PARTICIPANTS GROWING ROOTS FOR THIS PROJECT



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