**David Zhou**

Design + Engineering

Work Samples
2022

# David Zhou
## Design + Engineering

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## SKILLS

3D Printing
Adobe Illustrator
Fusion 360
Grasshopper
Gravity Sketch

Maya
Modo
Meshroom
Python
Unity

## LANGUAGES

English
Chinese (Mandarin)

## DISTINCTIONS

**University of California**                    2022
Distinguished Scholar Award

**Biennale Architettura**                        2021
Showcased Work

**NeurIPS**                                            2021
Published Research Co-author

**Innovative Design**                            2020
Runner up, CMYK Designathon

**NCEES**                                              2018
Engineer in Training (EIT)

## EDUCATION

**University of California, Berkeley**
» **Master of Design Candidate**, 2022
College of Engineering & College of Environmental Design
GRE: Quantitative: 166, Verbal: 165
GPA : 3.8

» **B.S. Mechanical Engineering**, 2017
College of Engineering

## EXPERIENCE

**Artificialis Relievo Graduate Student Researcher**                    05/21–11/21
» Utilized vector displacement maps of sculptural 3D models to train a StyleGAN model in order to develop a 3D-to-2D-to-3D generative data pipeline.
» Works showcased at **Biennale Architettura** and associated research published in **Architectural Digest, and the Conference on Neural Information Processing Systems (NeurIPS)**.

**DraftBuff Freelance Designer**                                                        06/20
» Executed a content, strategy, and design overhaul of a pitchdeck for an e-sports startup.
» Collaborated closely with the executive team under demanding time constraints to craft a compelling value narrative that **netted them their funding goal of $60K.**

**PENSOLE x adidas Design Intensive Apprenticeship**                09/19 ~ 11/19
» Developed a performance shoe concept for adidas in the untapped category of World Chase Tag.
» Commanded the holistic process of research, ideation, and visualization to 3D model and materialize the concept in Modo.
» 3D printed a functional midsole and upper overlays using TPU to show proof of concept.

**adidas x PENSOLE Advanced Concepts Camp Finalist**                07/19
» Co-created with PENSOLE instructors and adidas MakerLab mentors to iterate through solutions for a future performance basketball shoe.
» In 2 weeks, delivered a looks-like prototype tuned for women basketball players and their needs.

**EDGE + Co. Architecture Engineering Designer**                        11/17 ~ 09/19
» Coordinated with architects to design HVAC systems in healthcare centers across the Tri-state area.
» Utilized AutoCAD to lead the design of HVAC equipment layouts in a new 280,000 SF flagship facility.
» Within 8 months, earned a mentorship role leading and training new team members

# Artificial Archeology

3D printing as a tool for memorykeeping

Inspired by the Japanese craft of Kintsugi, this project uses robotic 3D printing to directly augment broken ceramics. Incorporating themes of loss, acceptance, and memory keeping, the project uses the sound of the ceramic breakage to inform the subsequently printed form. Broadly speaking, the project aims to reorient 3D printing from a process primarily concerned with creating things from scratch to one that meaningfully augments exisiting artifacts. Through this process, it hopes to incorporate aspects of manual crafts such as un/intentional defects and non-prescriptive outcomes into artifacts of digital design.

**Key Skills:** Concept Ideation | Algorithmic Design | 3D Modelling | Robotics Control

# inspiration
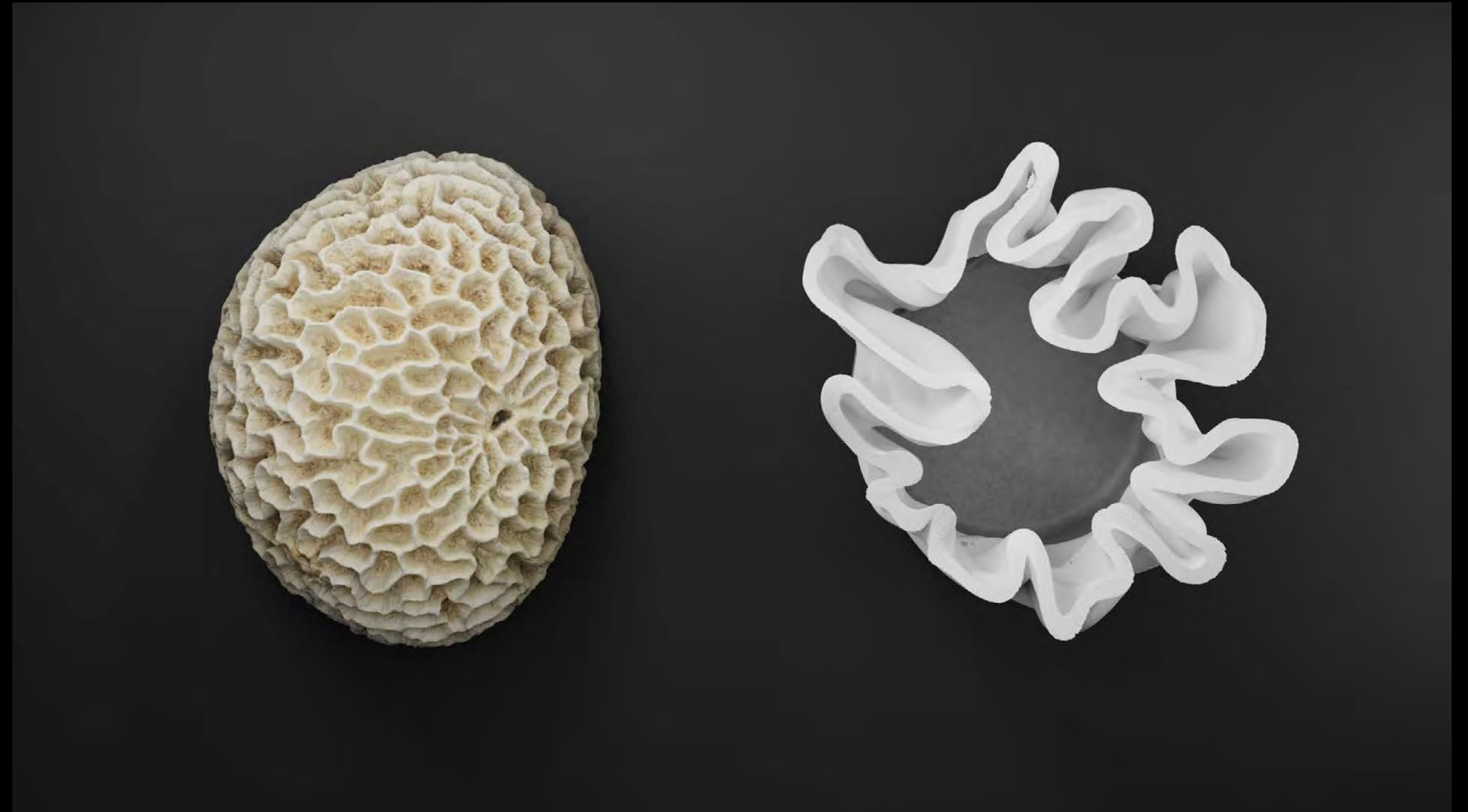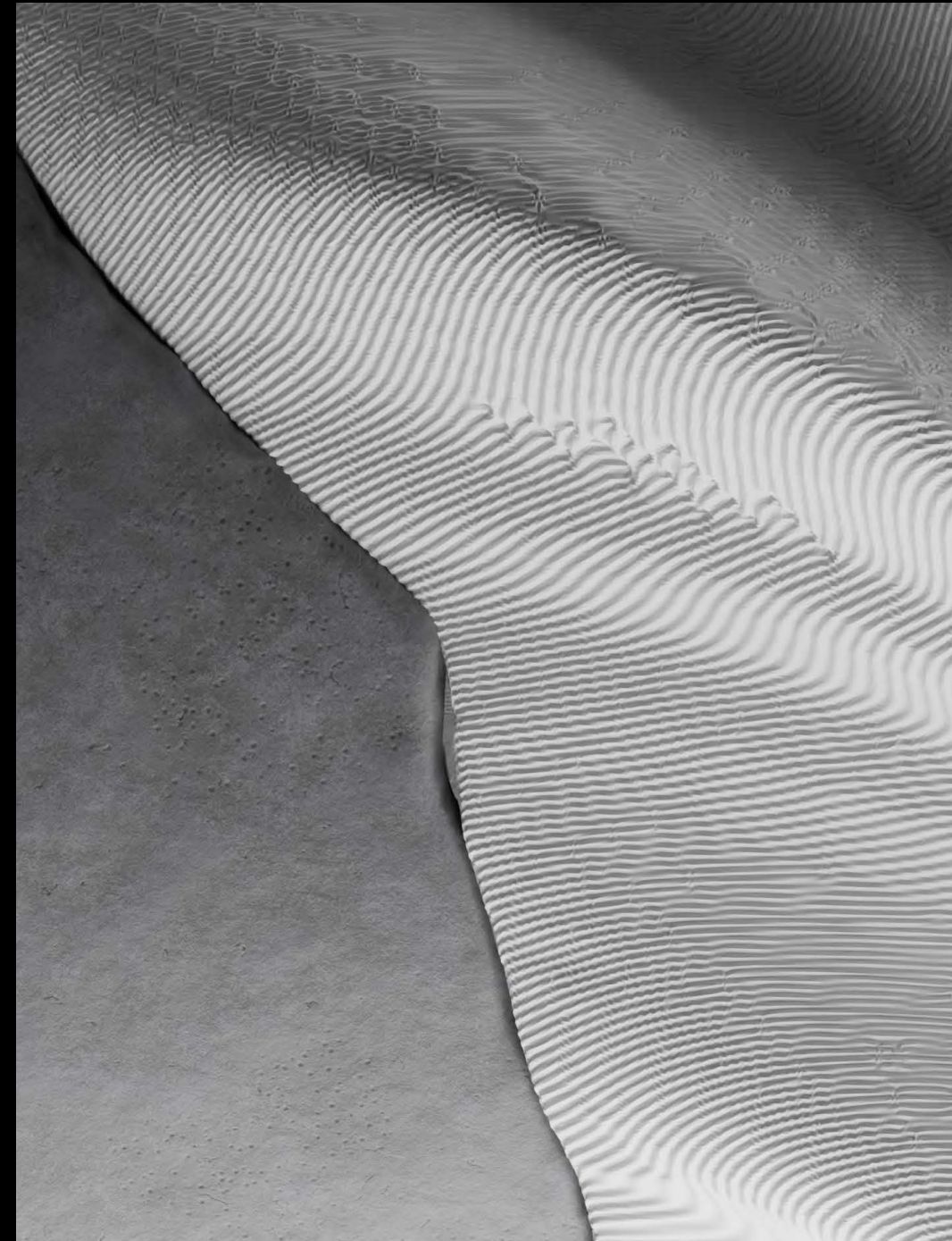


This project takes inspiration from the Japanese craft of Kintsugi, where broken porcelain is manually restored using lacquer adhesives.

**How might the act of material restoration manifest in digital design?**

**Left**: Goniastria-favulus Coral local to southern Japan.
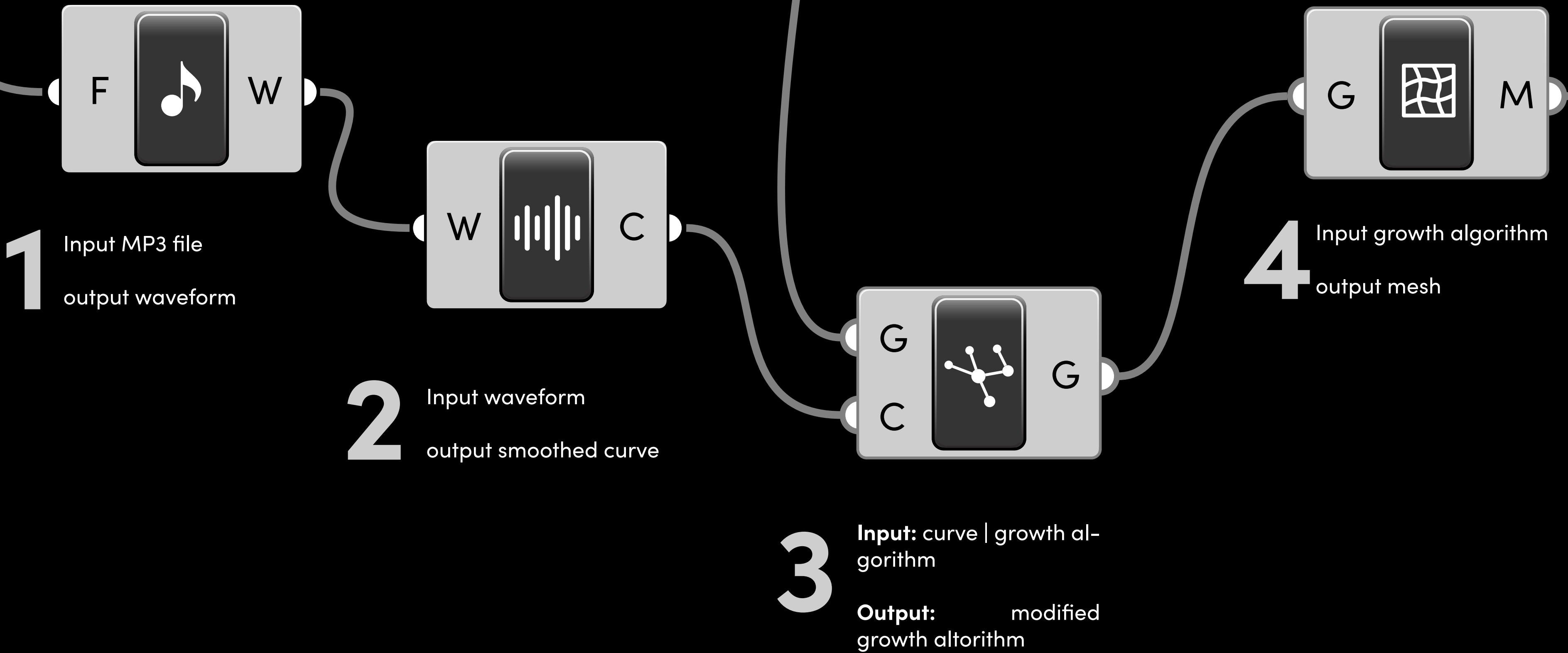**Right**: 3D printed form driven by a differential growth algorithm
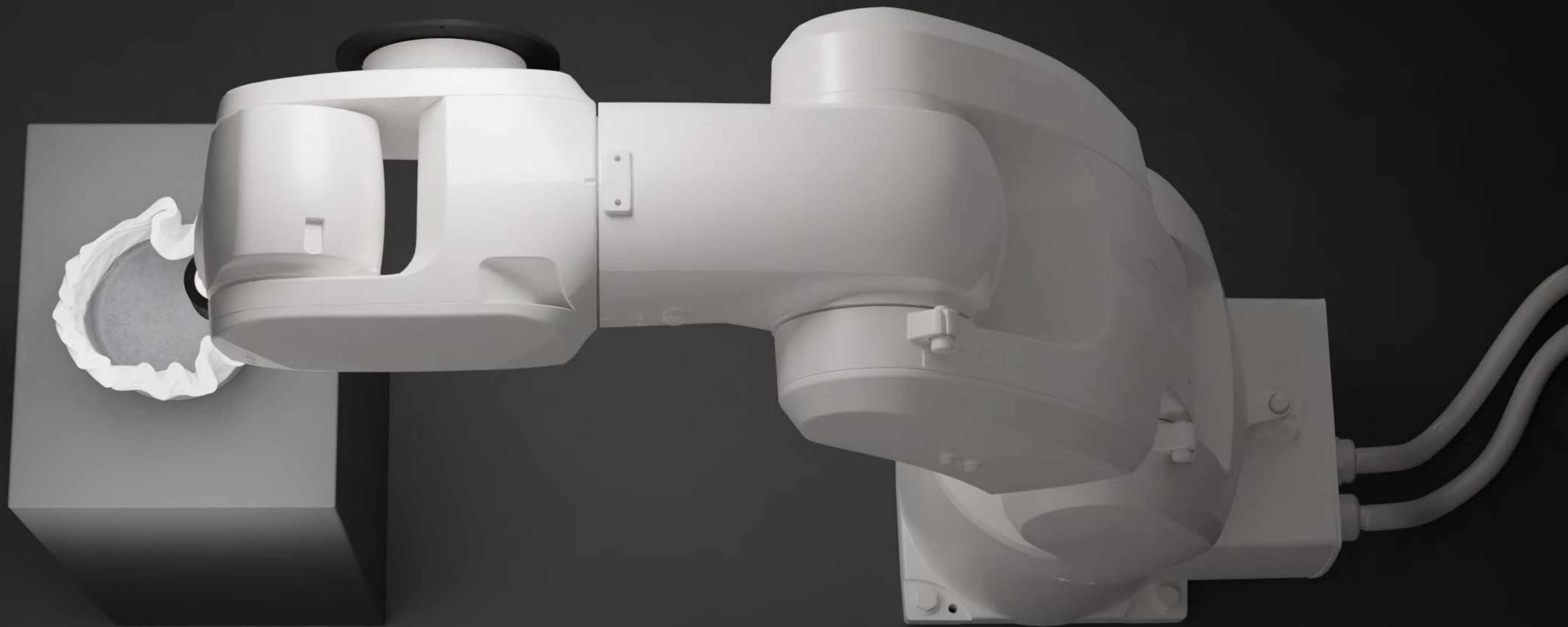
# material exploration
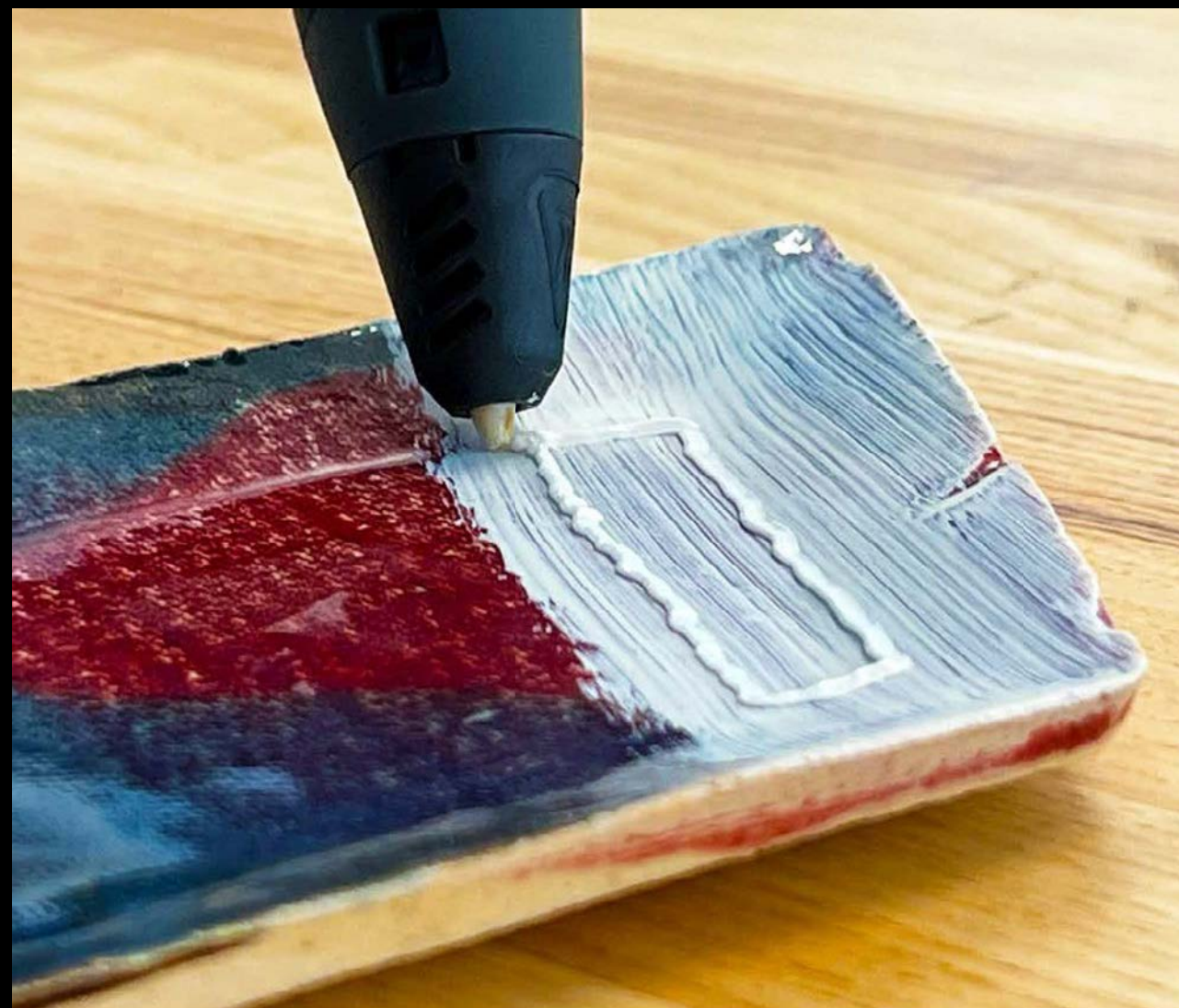




To enable surface agnostic 3D printing, this project develops a multi-purpose adhesive using 3 basic materials of clay, water, and polyvinyl alcohol. It enables most commonly encountered surfaces to become receptive for common 3D printed material (PLA, ABS, ASA, PETG, CPE) after a short drying period. This makes on-surface 3D printing much more accessible by eliminating the need to develop custom materials and extrusion apparatuses by granting general surfaces the prerequisite levels of first layer adhesion.

# geometry generation

**1** Input MP3 file

output waveform

**2** Input waveform

output smoothed curve

**3** **Input:** curve | growth algorithm

**Output:** modified growth altorithm

**4** Input growth algorithm

output mesh

# stud.io

a new medium for remote cocreation

Working, learning, and existing remotely is hard. How might we address feelings of social separation and screen fatigue? By introducing tangible interactions into a remote creative workflow, stud.io transports the collaborative spirit of art studio into your own home.

**Team:** Julia Park | Kailin Li | Georgios Grigoriadis | Titus Ebbecke

**Key Skills:** Concept Ideation | Consumer Research | 3D Modelling | Prototyping

**Chryssa Kotoula**

Visual Artist, Maker, Teacher

"Clay is a recorder of the body – how do you show that?"

**Larissa Mellor**

Artist, Instructor at Berkeley Art Studio

"There's no incentive for students to try hard if they can't see others working."

**Marvin Mannheimer**

Maker, Apparel Prototype Engineer at adidas

"You lose a lot by not being there... by not getting direct feedback "
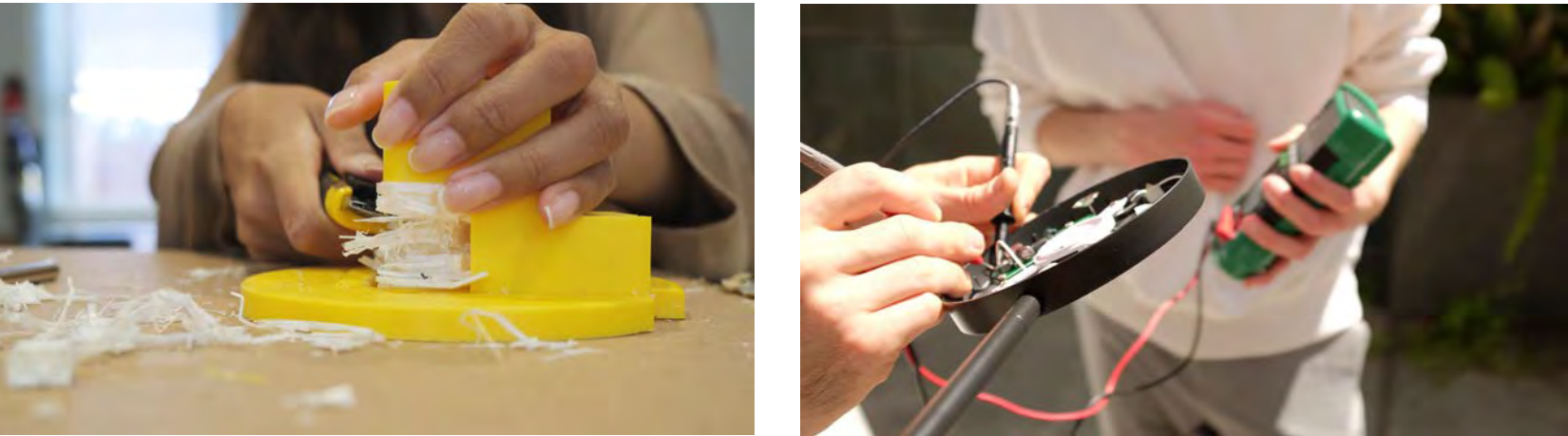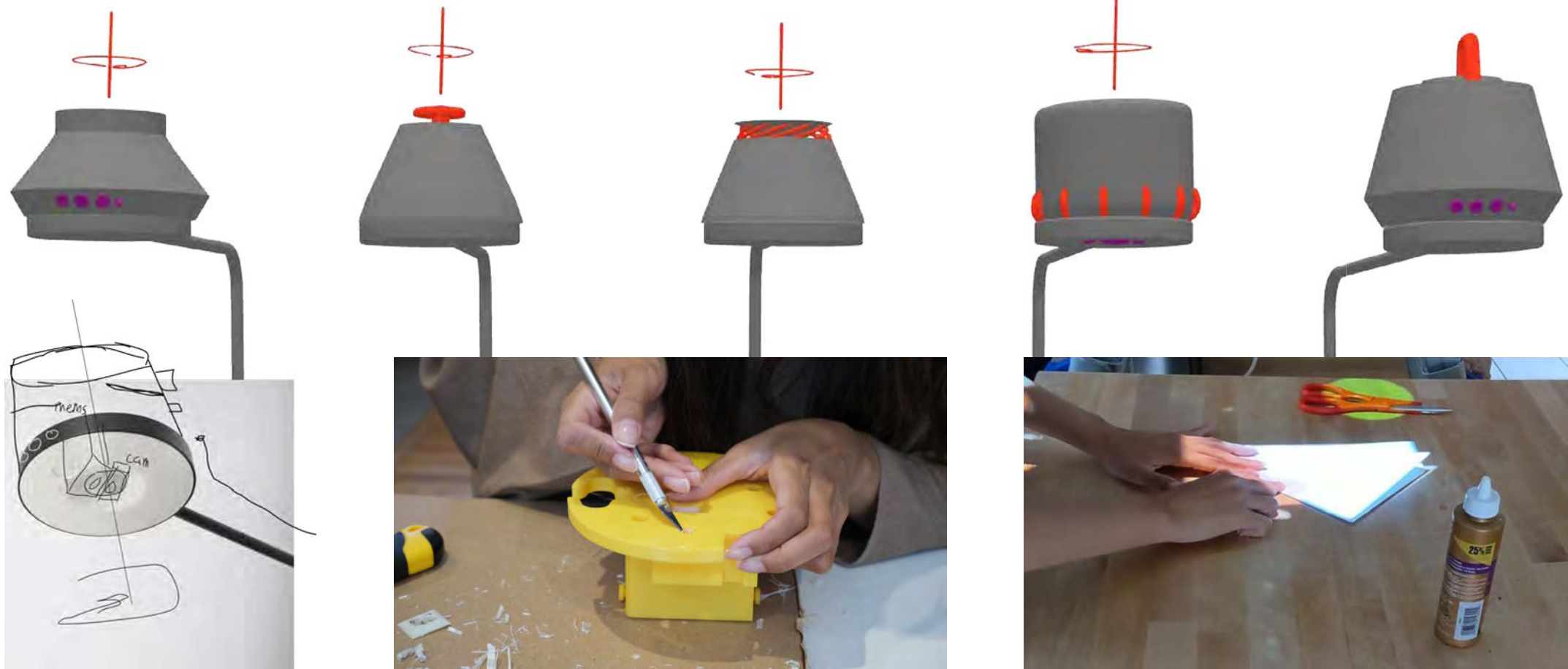
# The things they miss from studio

**Passive Presence
Spontaneous Interaction
Shared POV**

# prototyping



# studio in your home



Instruction from experts

Work next to peers

Follow along in real-time

## LED Buttons & Dial
Mute microphone
Toggle collab mode
Toggle work session mode
Adjust volume

## Enclosure
3D Printed
Heat venting
Audio pass-through

## Raspberry Pi
Crikit Hat
Wired to buttons & dials

## MEMS Laser
Microscanning projector for masked projections

## Webcam
FHD
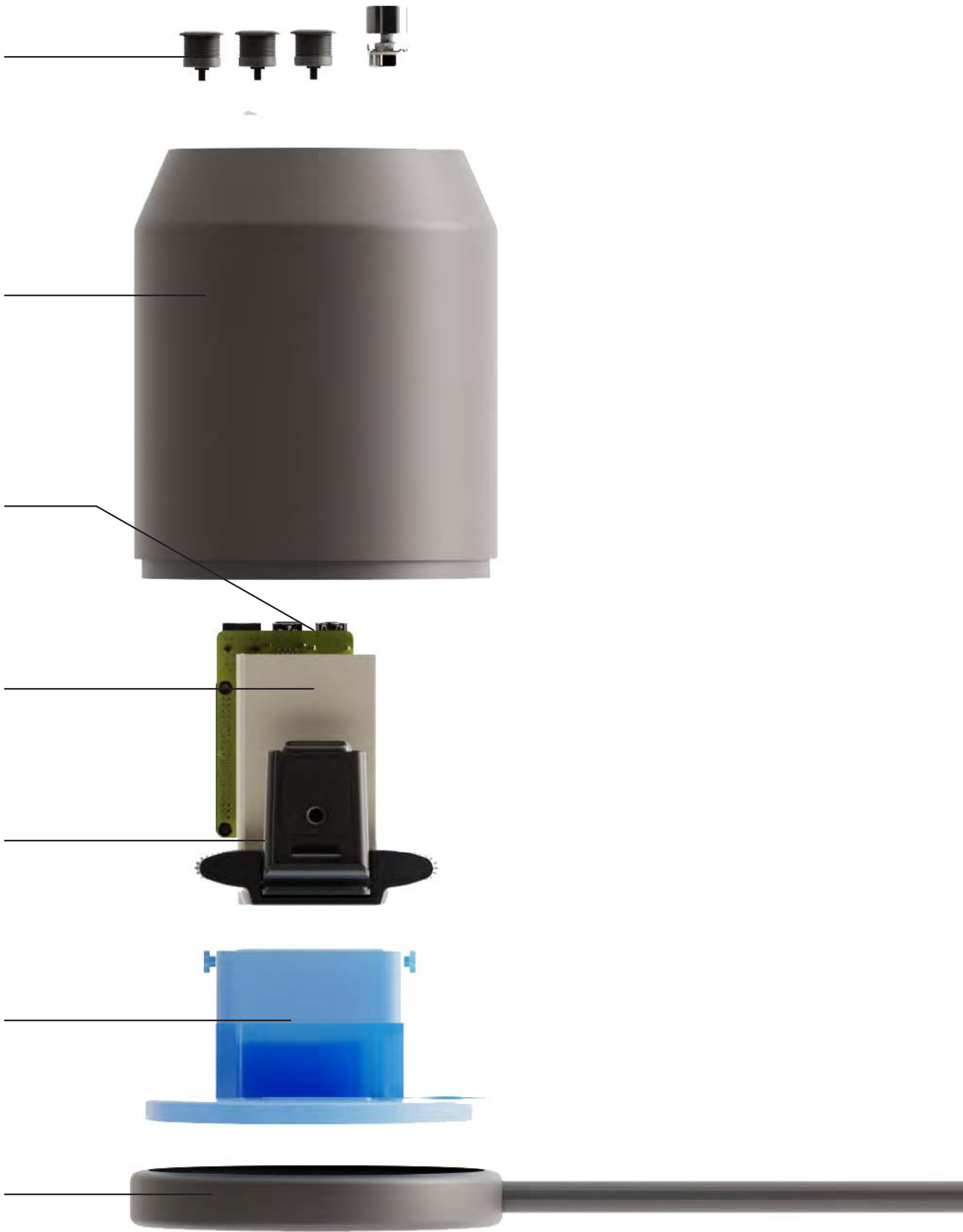Microphone

## Inner Frame
3D Printed
Mounts above components

## Stand
Hacked from IKEA lamp
Routes power cable
On/Off switch

# technical flow

**software**

**hardware**

Video Conference Client

Real Time masking Zoom Virtual backgrounds

```
import time
from adafruit_crickit import crickit
```

Hand Detection Finger Tracing

Python script Potensiometer Readings Hotkeys Buttons

WorkSpace Augmentation through Projection

IKEA YPPERLIG
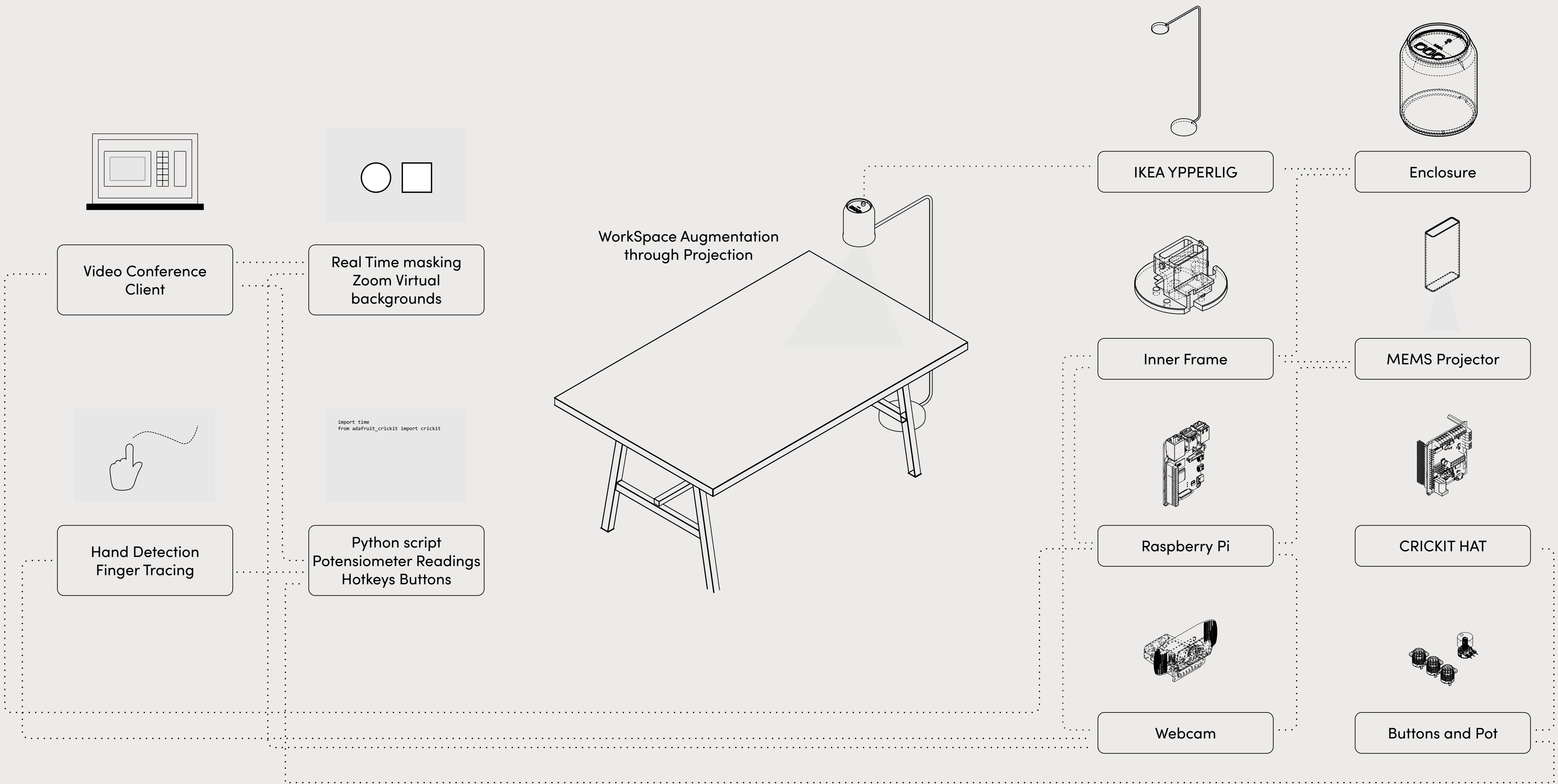
Enclosure

Inner Frame

MEMS Projector

Raspberry Pi

CRICKIT HAT

Webcam

Buttons and Pot

# Artificialis Relievo

an exploration of latent space in 3 Dimensions

Utilized vector displacement maps of sculptural 3D models to train a StyleGAN model in order to develop a 3D-to-2D-to-3D generative data pipeline. The resulting exploration was slated for showcase at **Biennale Architetettura** 2021, published in **Architectural Digest, and** accepted to the Conference on Neural Information Processing Systems (**NeurIPS**) 2021.

**Team:** Prof. Kyle Steinfeld, Georgios Grigoriadis, Titus Ebbecke

**Key Skills:** Grasshopper | 3D printing | Cast Postprocessing |

**3D**

Collect 3D Models

Extract interesting features

**2D**

Convert 3D Geometry to
Vector Displacement Maps.

Train StyleGAN model on VDMs

Output sequence of generated
VDMs across latent space.

**3D**

Convert generated VDMs
into 3D geometry for
rendering + printing

Vector Displacement Maps are 2 dimensional representations of 3 dimensional geometry. Conceptually, each pixel of a 2D vector displacement map stores the coordinates of a point precisely defined by information stored in the colorspace of the pixel.

Conventionally used to generate images that are intuitively understood, StyleGAN in this context is used as a dimensional translator: operating in tandem with human curation in a novel way to yield a 3D result.
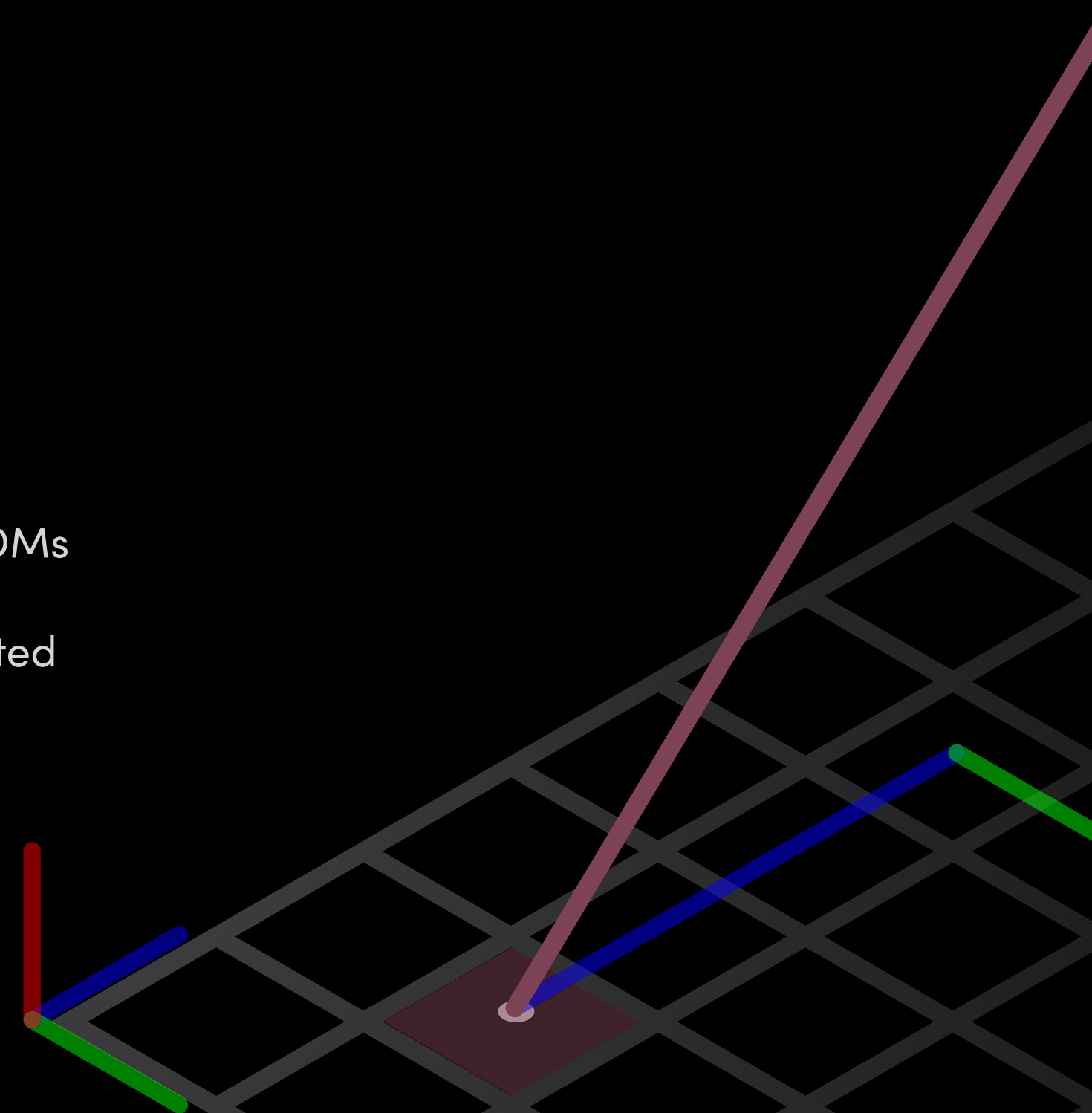
# fabrication
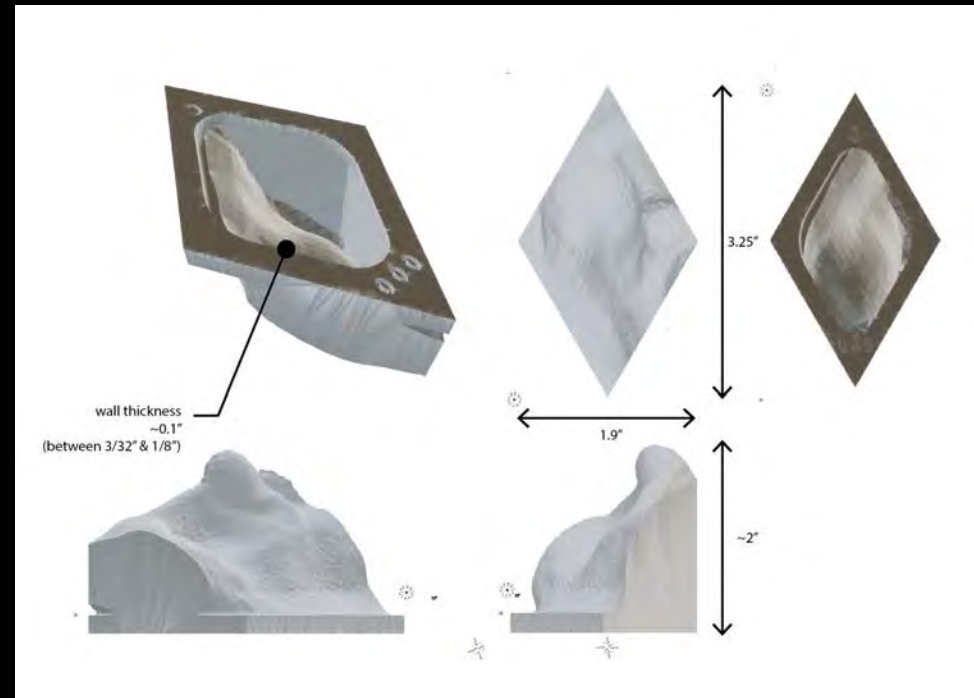


Selections of interesting geometry are extracted from the generated 3D models accross a latent space walk and normalized onto a tileable base. The resulting forms are 3D printed, molded, cast in bronze, and arranged as shown. The final form embodies recognizable greco-roman sculptural features in a discretized, binary arrangement as a nod to it's co-author: a neural network.

# Modspace

Imagining the future of personal living space

Developed an augmented reality experience depicting the future of personal living space using Unity. As a piece of **speculative critical design**, this project aims to rigorously examine emerging trends in personal housing and how they might manifest in a 20 year time window. This project was featured as a live demo at UC Berkeley's Design Showcase in December 2021.
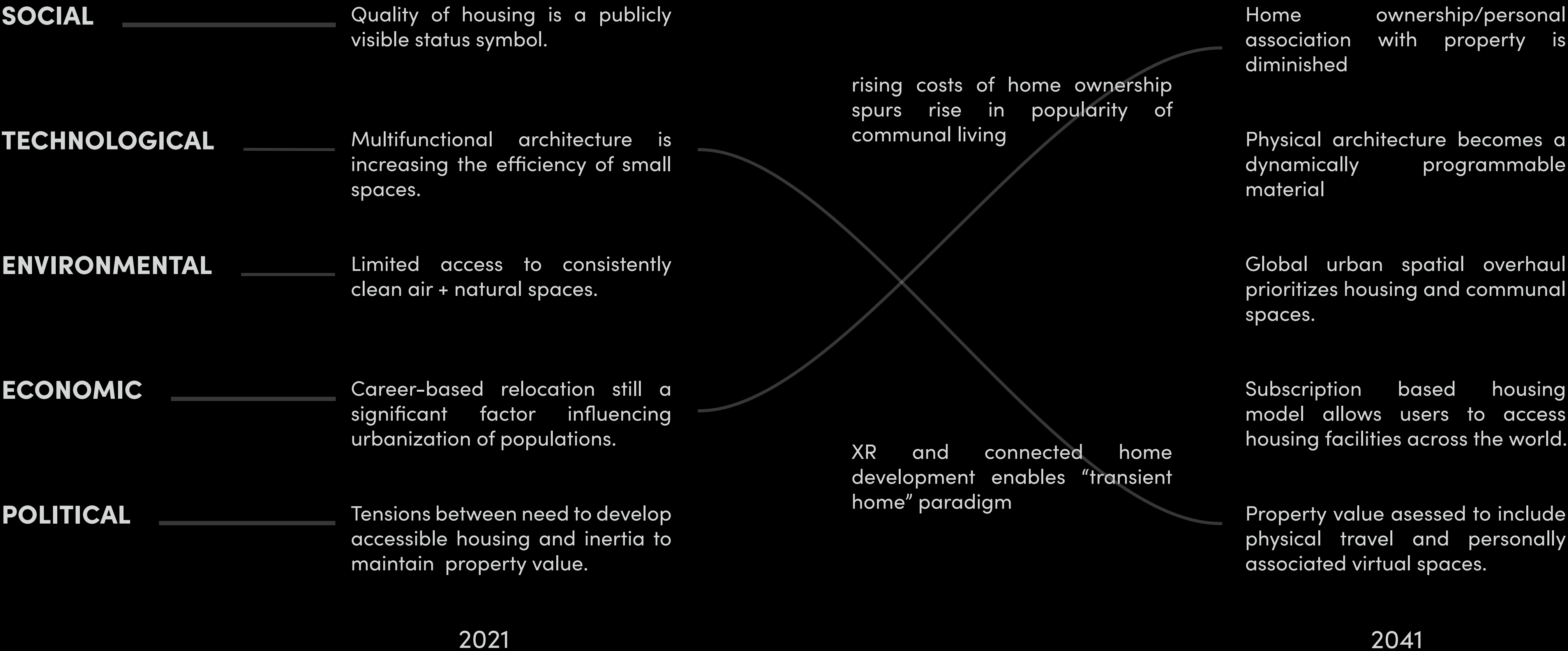
**Team:** Elijah Lee

**Key Skills:** Unity AR | Blender | Design Fiction | STEEP Analysis |
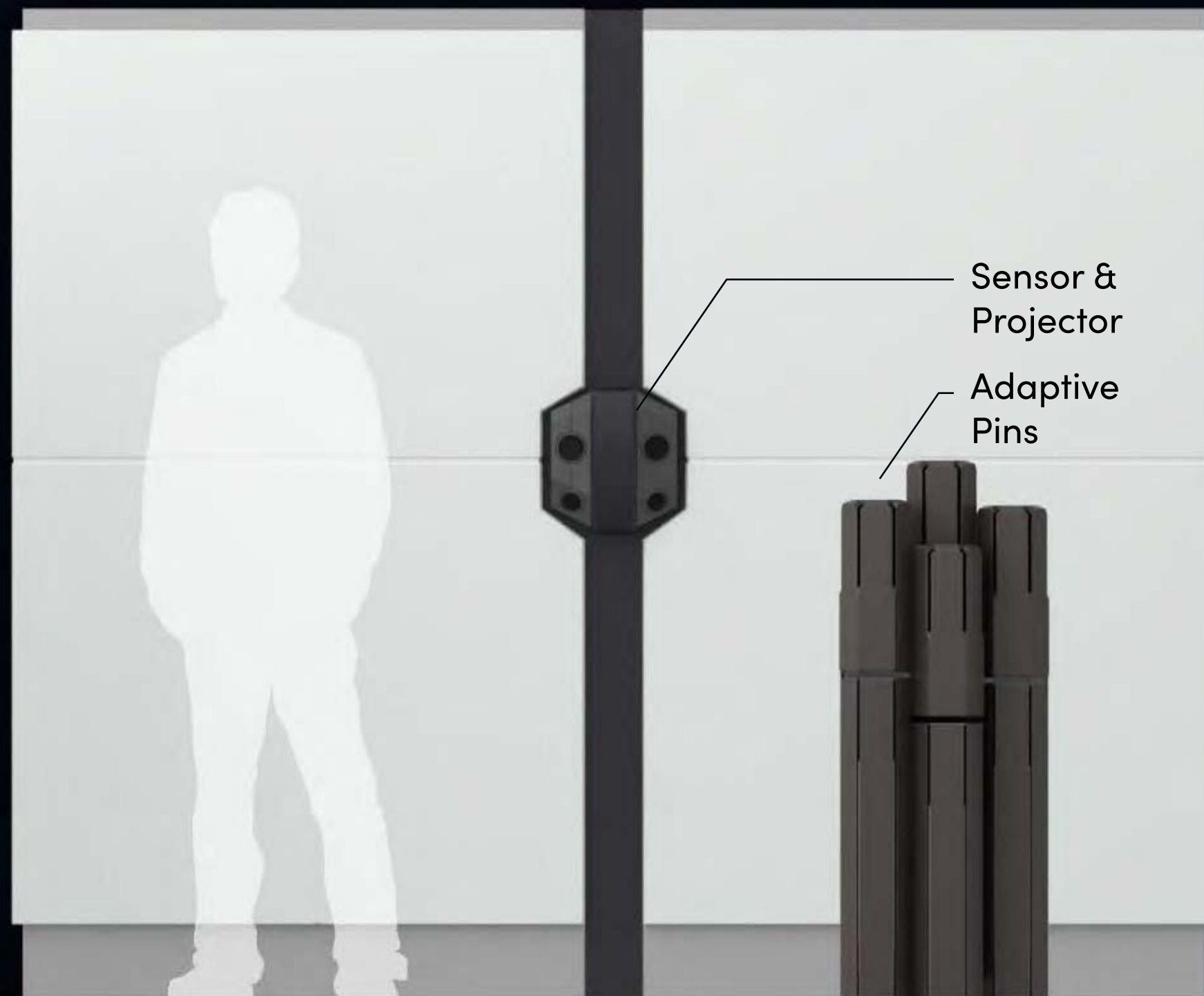
# Establishing Futures

**SOCIAL** — Quality of housing is a publicly visible status symbol.

rising costs of home ownership spurs rise in popularity of communal living

Home ownership/personal association with property is diminished

**TECHNOLOGICAL** — Multifunctional architecture is increasing the efficiency of small spaces.

Physical architecture becomes a dynamically programmable material

**ENVIRONMENTAL** — Limited access to consistently clean air + natural spaces.

Global urban spatial overhaul prioritizes housing and communal spaces.

**ECONOMIC** — Career-based relocation still a significant factor influencing urbanization of populations.

Subscription based housing model allows users to access housing facilities across the world.

XR and connected home development enables "transient home" paradigm

**POLITICAL** — Tensions between need to develop accessible housing and inertia to maintain property value.

Property value asessed to include physical travel and personally associated virtual spaces.

2021

2041

# Proposed Future

Sensor & Projector

Adaptive Pins

Room composition shifts when the inhabitant exits, then re-enters the room. The adaptive pins will take the general form of the furniture/fixtures of each space, while the visual details are overlayed via projection mapping





In 2041, advancements in projection mapping and modular architecture enable rooms to adapt to fit inhabitants' many usecases. This multifuncionality allows a single physical room to "feel" like multiple rooms by utilizing non-euclidean spatial design techniques.
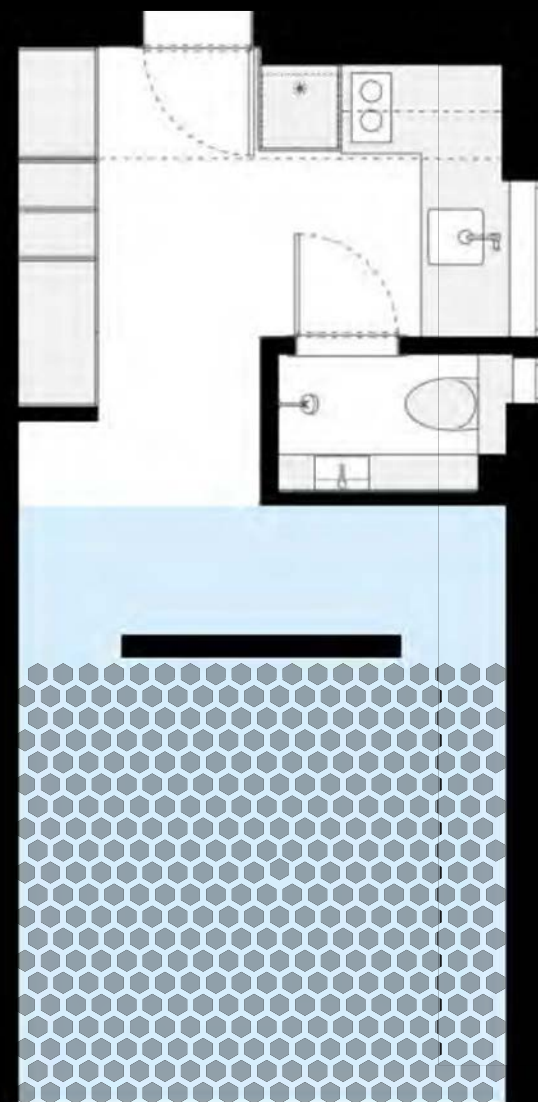
# Proposed Future

Conceptualized how the identified trends in urban personal housing could manifest in 2041. Realized in augmented reality using **Unity Engine**.



**Collaboration Space**
How might people connect with others in the future?

**Memory Space**
How might people interface with spatial recollection in the future?

**Living Space**
How might people relax in the future?