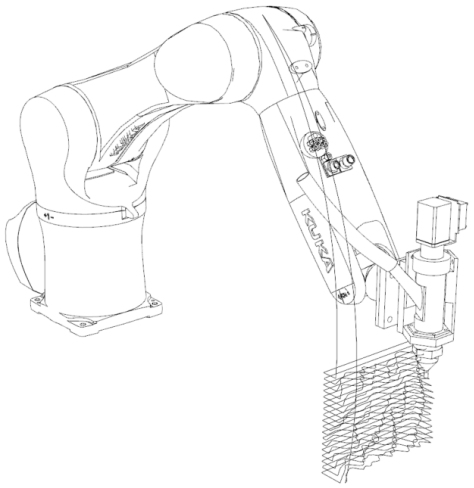
Tova Gold

Computational Design Portfolio



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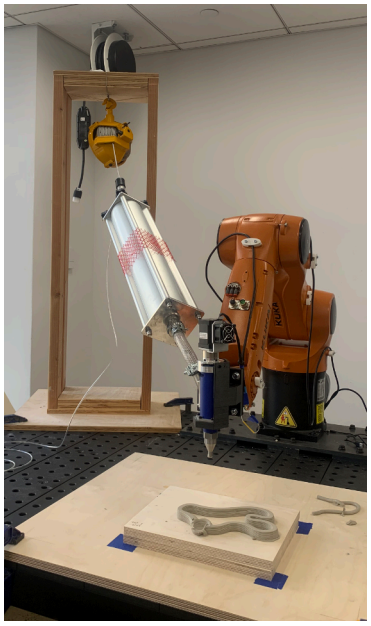
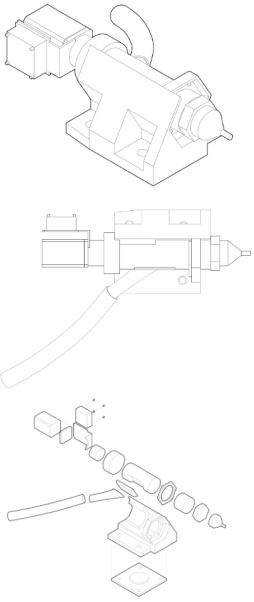
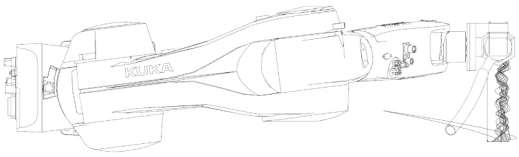
KUKA Clay Printing

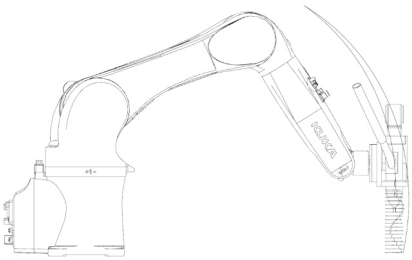
Developed a workflow for 3D printing with clay with a KUKA KR 6 R900 robotic arm. This system uses a 5 L aluminum clay tank and air compressor to feed clay into an extruder on the end of the robot. Part of an assistantship in the NYIT Fabrication Lab.

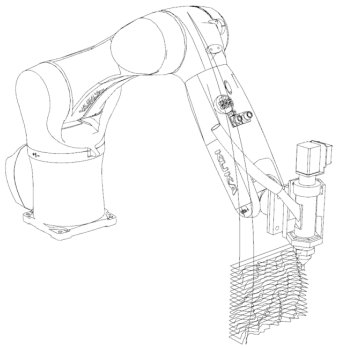


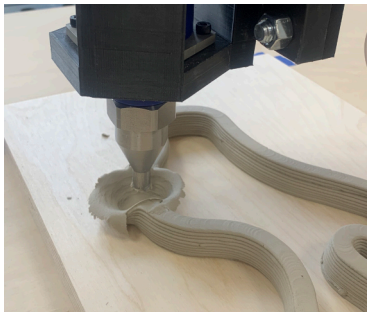


The end effector is an LDM WASP Extruder XL 3.0 with 8 mm nozzle.

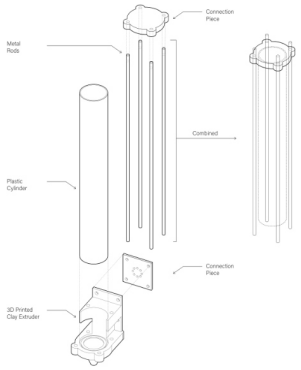


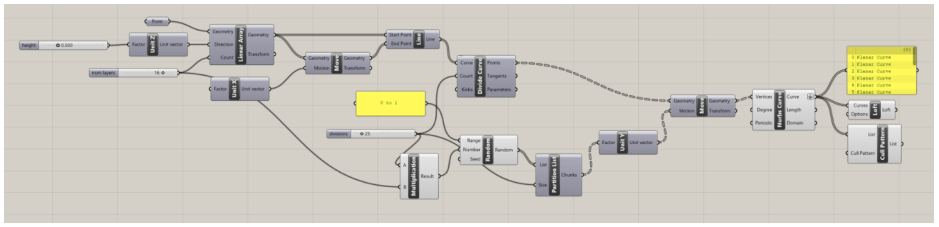




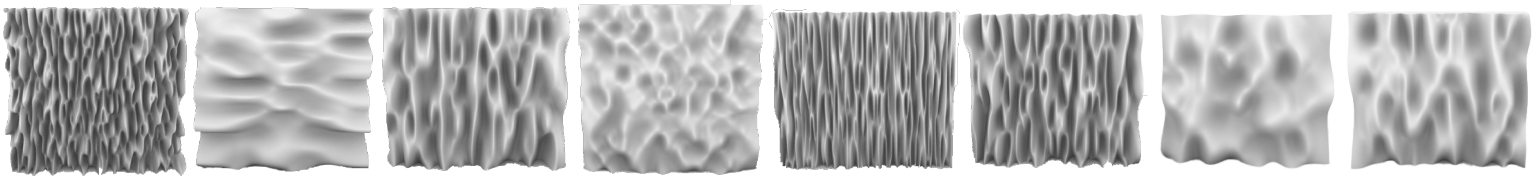


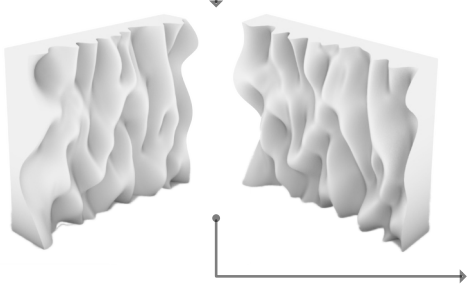
Air bubbles are a consistent problem when using an air compressor.

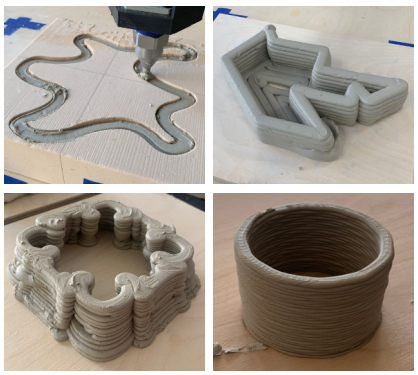




Above: Grasshopper script for test panel generation.
Below: Form-finding for test panel.

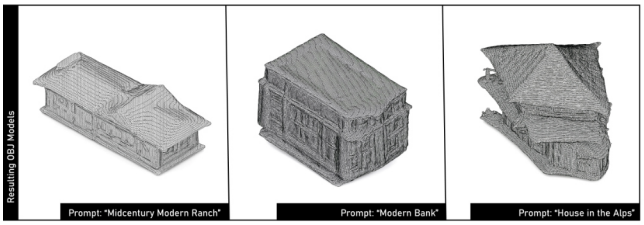




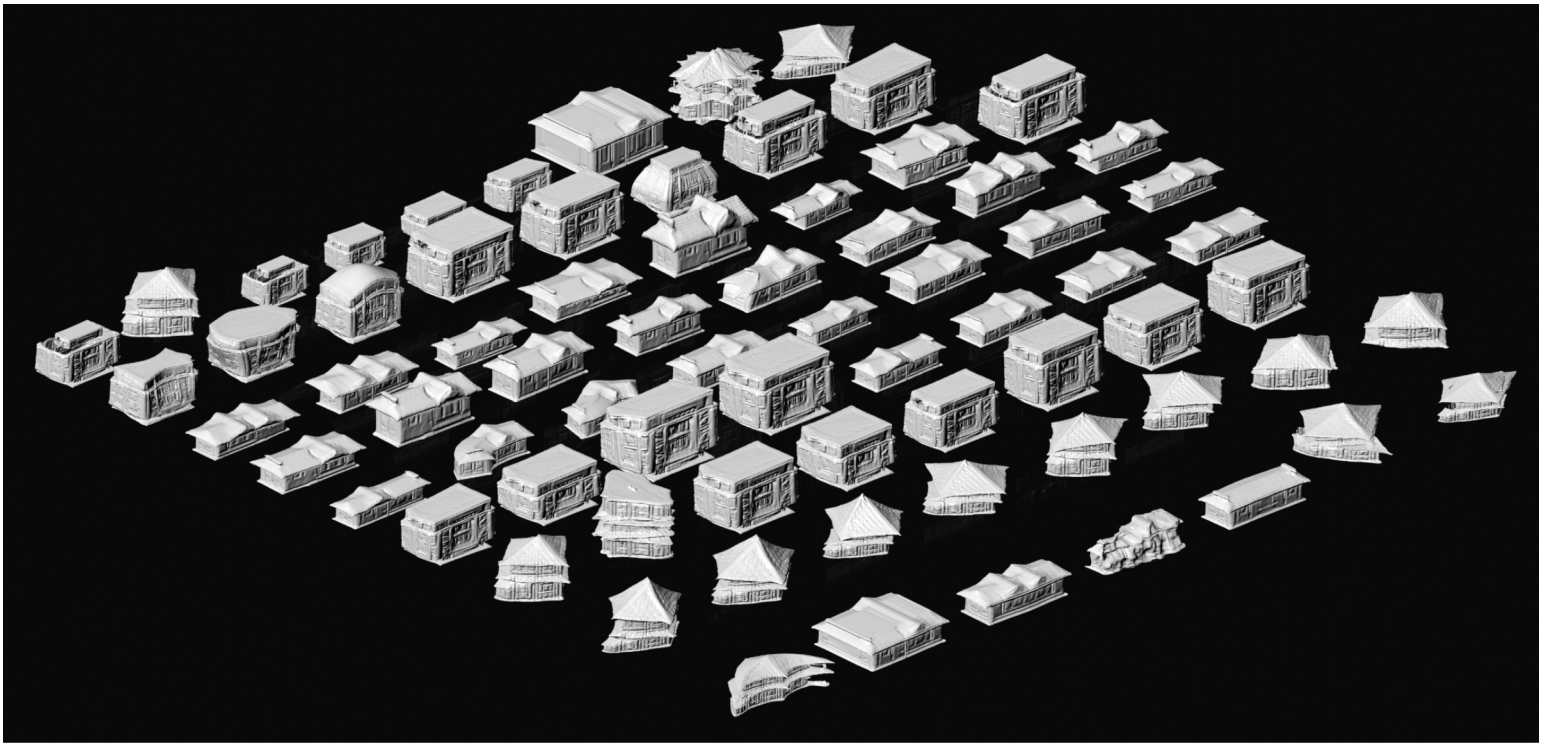


The American Dream

The American Dream (2025)
Laser-cut chipboard
53 in. × 53 in. × 5 in.
Matias del Campo and Sandra Manninger
Consultants: Alexandra Carlson, Danish Syed
Design team: Omar Aljabery, Tova Gold
Exhibition: Transductions: Artificial Intelligence in Architectural Experimentation at the Schlafler Gallery, Pratt Institute Brooklyn Campus, February - March 2025

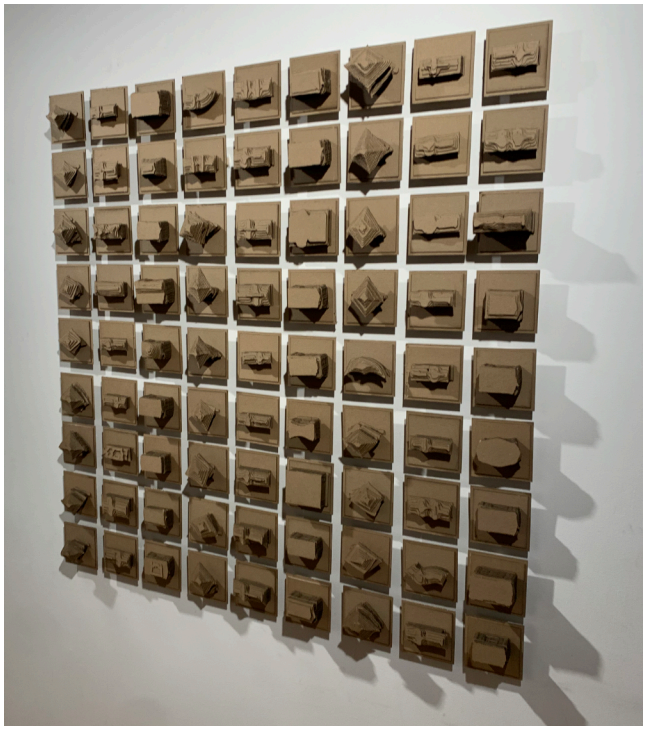


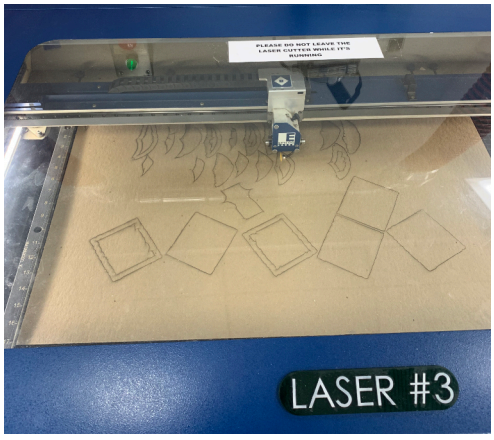
Above: For this project, a machine learning model was trained on a unique dataset of meshes modeled from extant single-family homes in Michigan. The model then took a text prompt as input and produced as output a generated mesh.



Above: The output meshes from the machine learning model were procedurally deformed for variation. Each model was sliced into layers and each layer was laser-cut from chipboard and assembled with glue.

Right: The final piece consisted of 81 models mounted on the wall in a grid.

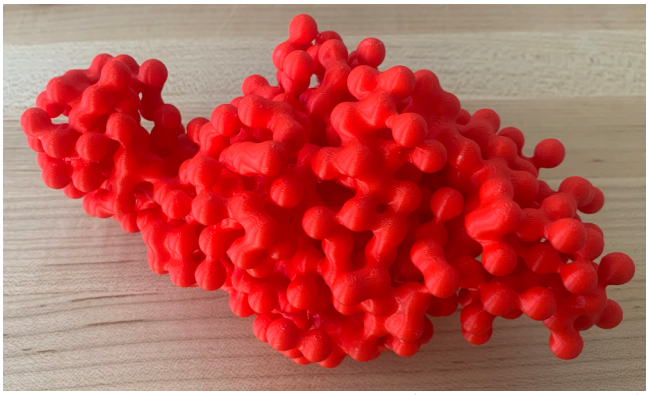




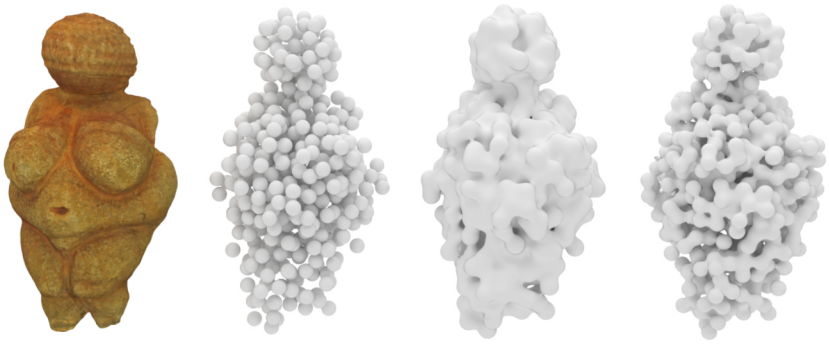
Right: Laser cutting pieces with Epilog Fusion M2.

Metaball Study

This project began as an investigation into metaballs as a base for a fabrication system for a theoretical lunar base. Metaballs can be used in a system of identical pieces created from the same mold that could be used to construct arbitrary forms.

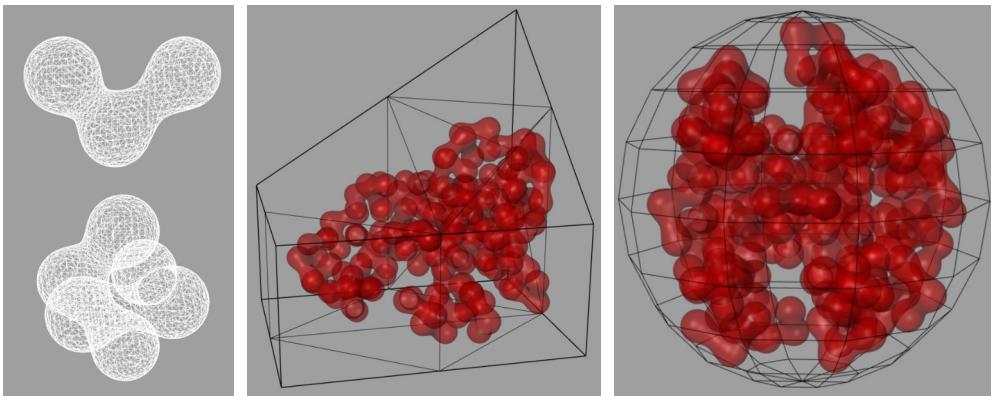


Above: 3D print of final form (PLA, Bambu A1).



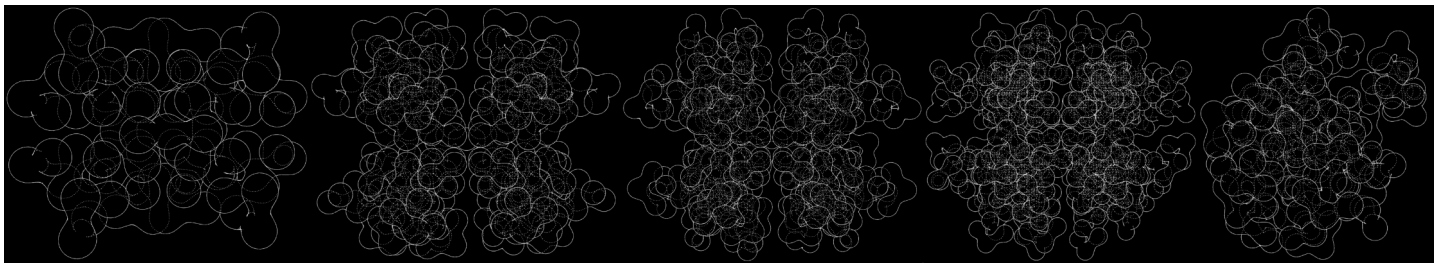
Left: The Venus of Willendorf, one of the oldest known works of art at ~30,000 years old, was chosen as a subject to be fabricated with this yet-uninvented method. A 3D mesh (courtesy of the Smithsonian Institute) was first populated randomly with spheres. Those spheres were sent to a metaball algorithm which generated a contiguous shape. Parameters were adjusted to arrive at a final form.

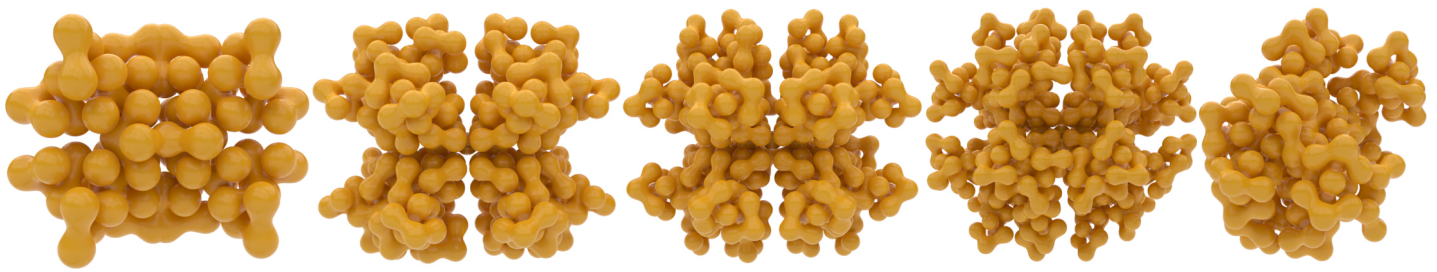
```
# requirements: bigtree

class joint:
    def __init__(self, p1, p2, p3):
        self.p1 = p1
        self.p2 = p2
        self.p3 = p3

    def get_twin_center(self):
        l = rg.Line(self.p2, self.p3)
        midpoint = l.PointAt(0.5)
        l2 = rg.Line(self.p1, midpoint)

        vec1 = rg.Vector3d(midpoint.X - self.p1.X,
           midpoint.Y - self.p1.Y, midpoint.Z - self.
           p1.Z)
        scale_transform = rs.XformScale((2.0, 2.0, 2.0),
           self.p1)
        scaled_line_id = rs.TransformObject(l2, scale_
           transform, copy=False)
        return l2.PointAt(1.0)

    def get_twin_points(self):
        l = rg.Line(self.p2, self.p3)
        midpoint = l.PointAt(0.5)
        l2 = rg.Line(self.p1, midpoint)
        vec1 = rg.Vector3d(midpoint.X - self.p1.X,
           midpoint.Y - self.p1.Y, midpoint.Z -
           self.p1.Z)
        scale_transform = rs.XformScale((2.0, 2.0, 2.0),
           self.p1)
        scaled_line_id = rs.TransformObject(l2, scale_
           transform, copy=False)
        newpt1 = l2.PointAt(1.0)

        l3 = rg.Line(self.p1, newpt1)
        rotaxis = rg.Vector3d(self.p1 - newpt1)
        l4 = rg.Line(self.p2, self.p3)
        rs.RotateObject(l4, l4.PointAt(0.5), 90,
           rotaxis, copy=False)

        newpt2 = l4.PointAt(0.0)
        newpt3 = l4.PointAt(1.0)
        return newpt1, newpt2, newpt3
```



Left: Code snippet of procedural generation algorithm. The script creates a joint structure by defining three center points. Neighboring joints are derived through vector rotations. The script iterates through a binary tree while checking for collision with previous joints and the bounding geometry until no more joints can be added.

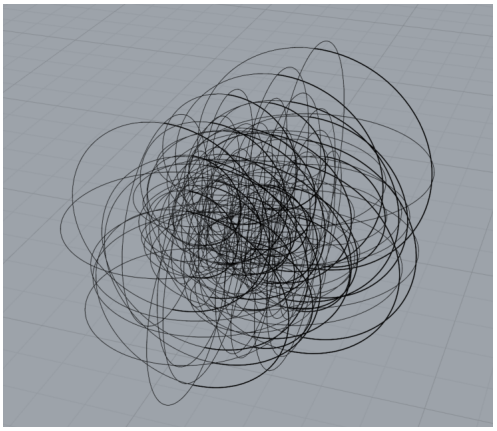
Below: Studies in growth patterns using different methods to iterate through binary trees.

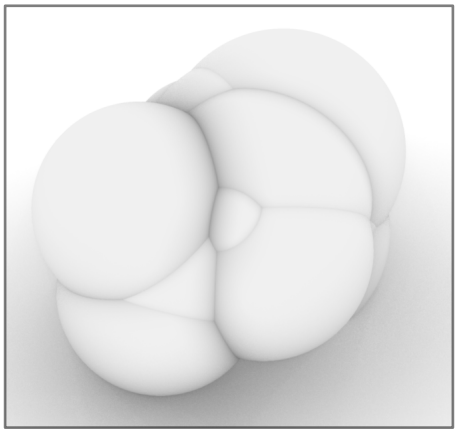


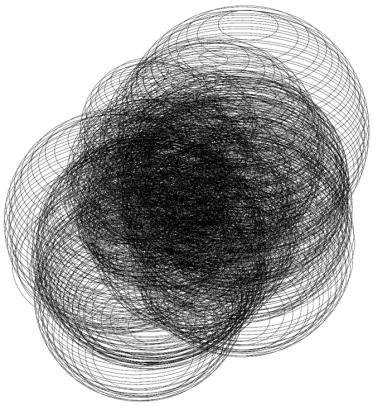


Intersecting Sphere Study

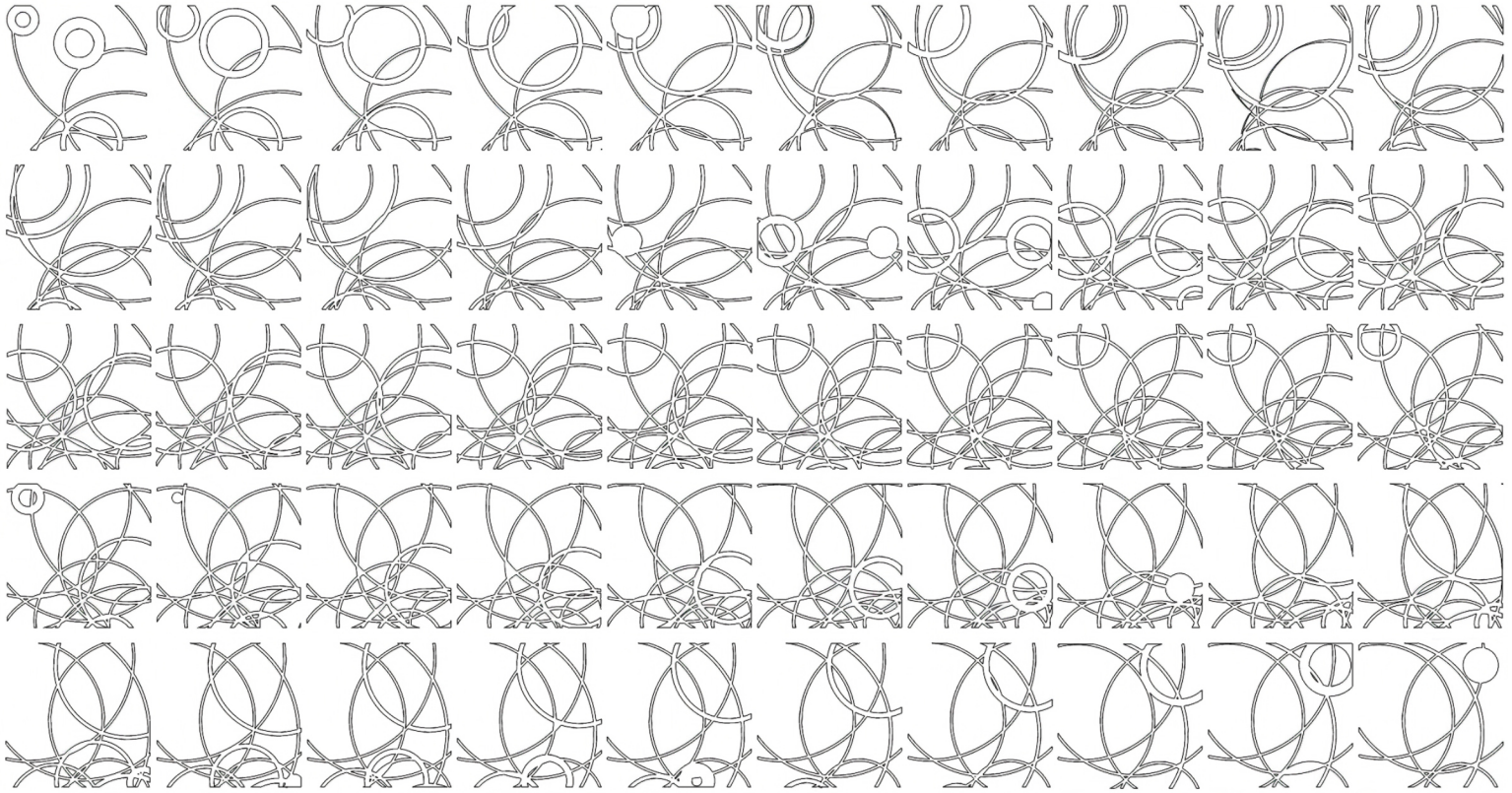
The goal for this project was to study the forms that arise when spheres intersect.





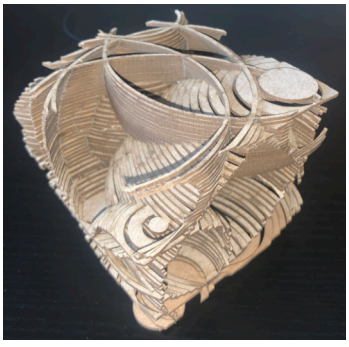


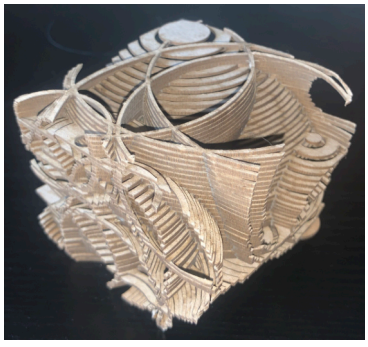
Above: Random distribution of spheres within volume and contoured slices of combined shapes.

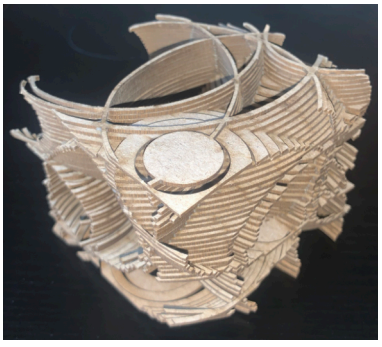


Above: Laser cut patterns for each layer of the construction.

Below: Final assembled piece.

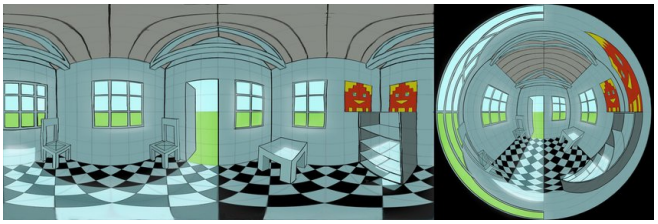






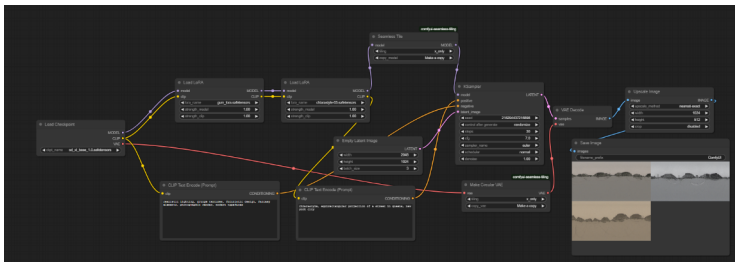
Sgrinzatto Diffusion

Collaboration with the Italian artist Chiara Masiero Sgrinzatto. Sgrinzatto draws freehand equirectangular projections of 360° panorama views from life. The goal of this project was to train an image diffusion model on Sgrinzatto's art and generate similar projections based on text prompts.

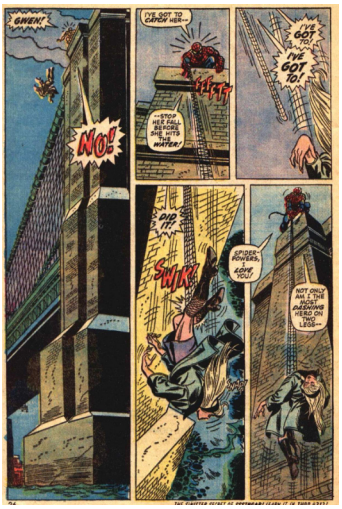


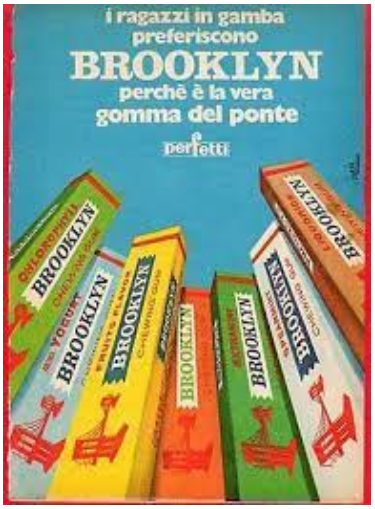
Equirectangular panorama of cubical room compared with azimuthal equidistant perspective of same. Graphic by António Araújo.

Left: Examples of Sgrinzatto's drawings included in the training data.



Above: ComfyUI workflow for image generation with positive prompt, negative prompt, custom LoRAs, seamless tiling node, circular generation VAE, and image upscaler.

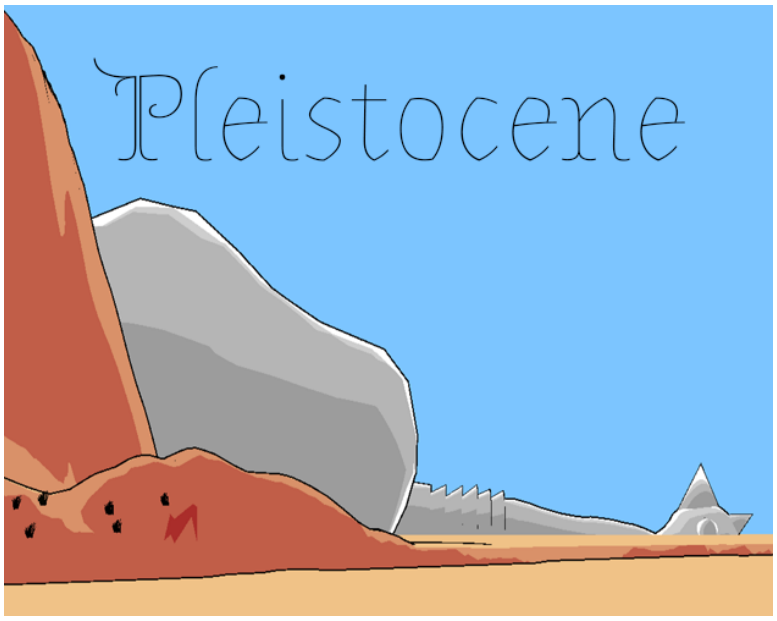




Right: LoRA (Low-Rank Adaptation) models were trained on datasets of Sgrinzatto's art with different parameters. Other LoRA models were trained on curated datasets of silver age comic books, 1950s advertising and packaging, and early Hollywood iconography.

Below: Images generated by workflows using custom LoRAs trained on Sgrinzatto's art and other datasets.

Game Development

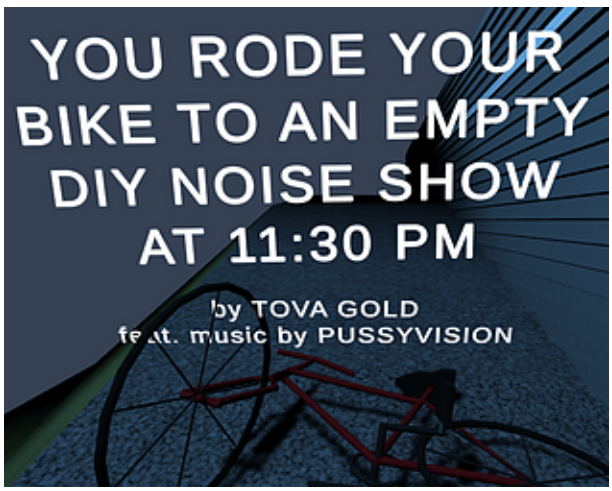


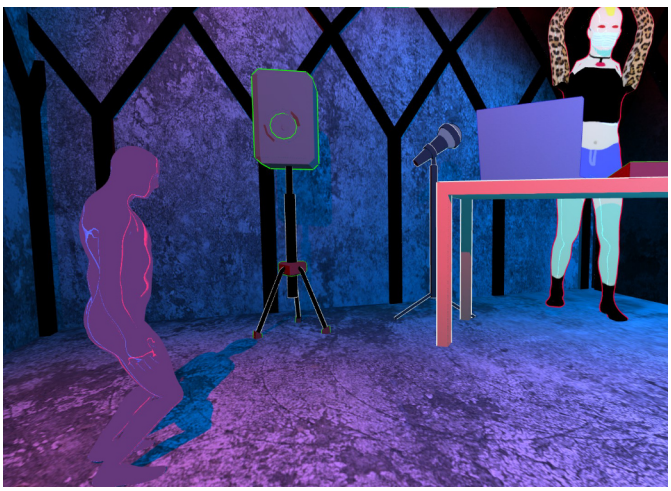
Pleistocene (2020)
Thesis project for completion of Bachelor of Fine Arts at University of Massachusetts-Amherst. Exhibited at the UMass Herter Gallery December 2020. First-person game in which the player explores an ancient desert and speaks to characters including a crash-landed alien and an oasis goddess.

These games were developed using Unity and Blender.

New York Stand-Up 1/10/21 (2021)
First-person game that simulates the experience of delivering a five-minute stand-up comedy set in an empty nightclub.

You Rode Your Bike to an Empty Noise Show at 11:30 PM (2020)
First-person game in which the player explores a DIY basement show. Features original music by Massachusetts noise musician Pussyvision (pussyvision.bandcamp.com)





All games are available for download at tova-gova.itch.io.