Haptic Memory Game for Children

fun x inclusivity

what is blindness?

blind artists : current methodologies

our solution

methodology

physical prototypes

conclusion


eate.

The **Spectrum of Blindness**

Glaucoma

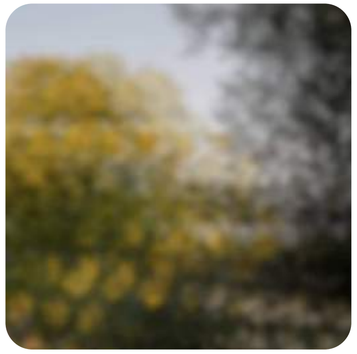
Macular Degeneration

Cataracts

Diabetic Retinopathy

Achromatopsia

Cortical/Cerebral Vision Impairement



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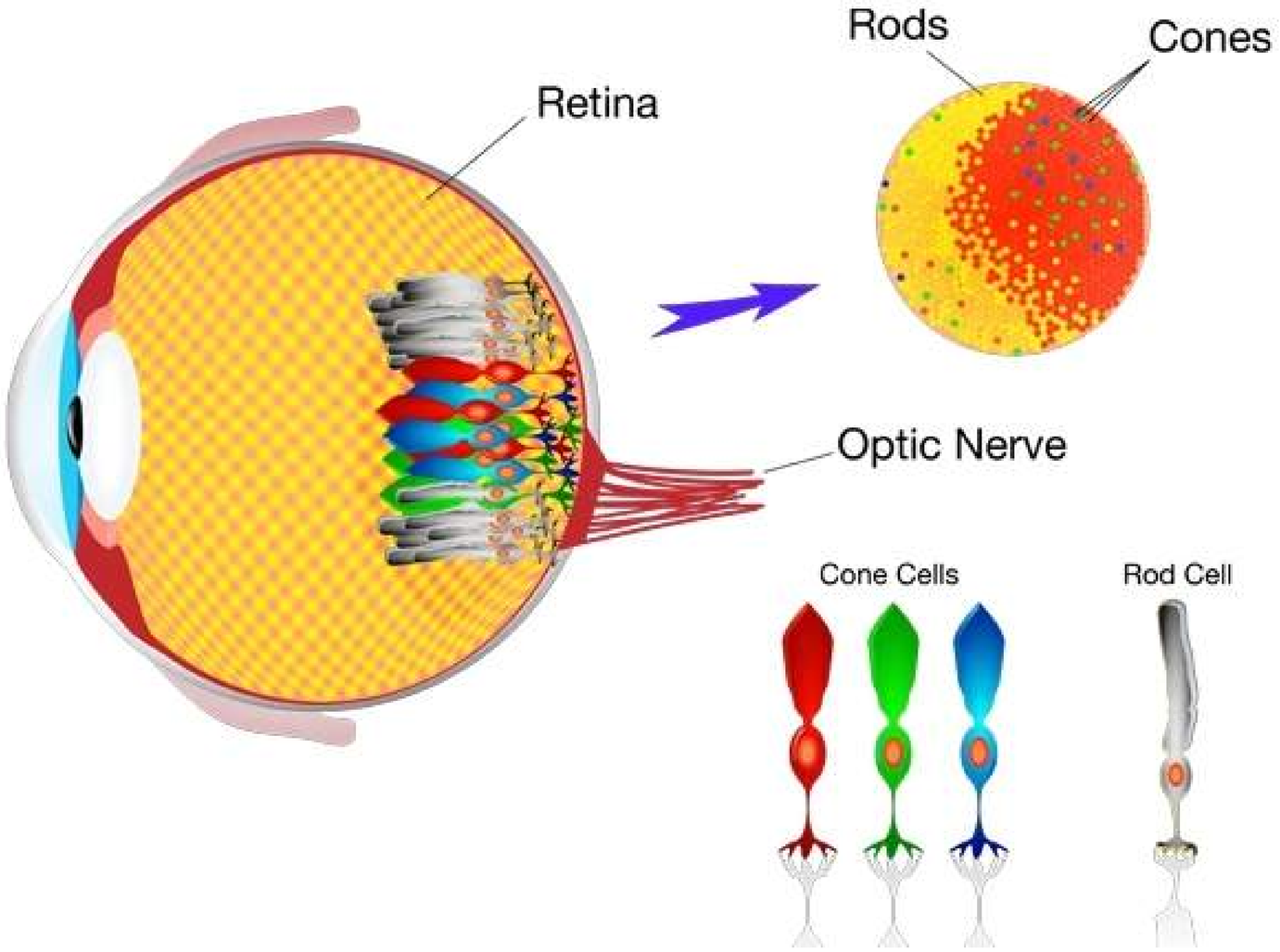
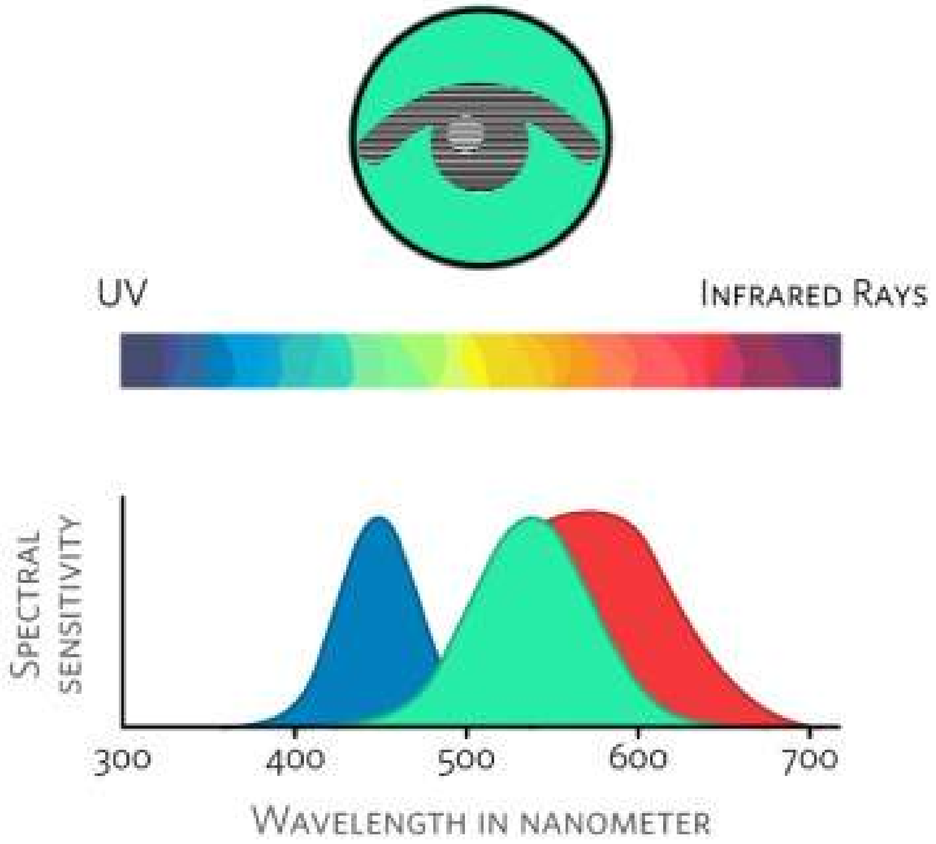
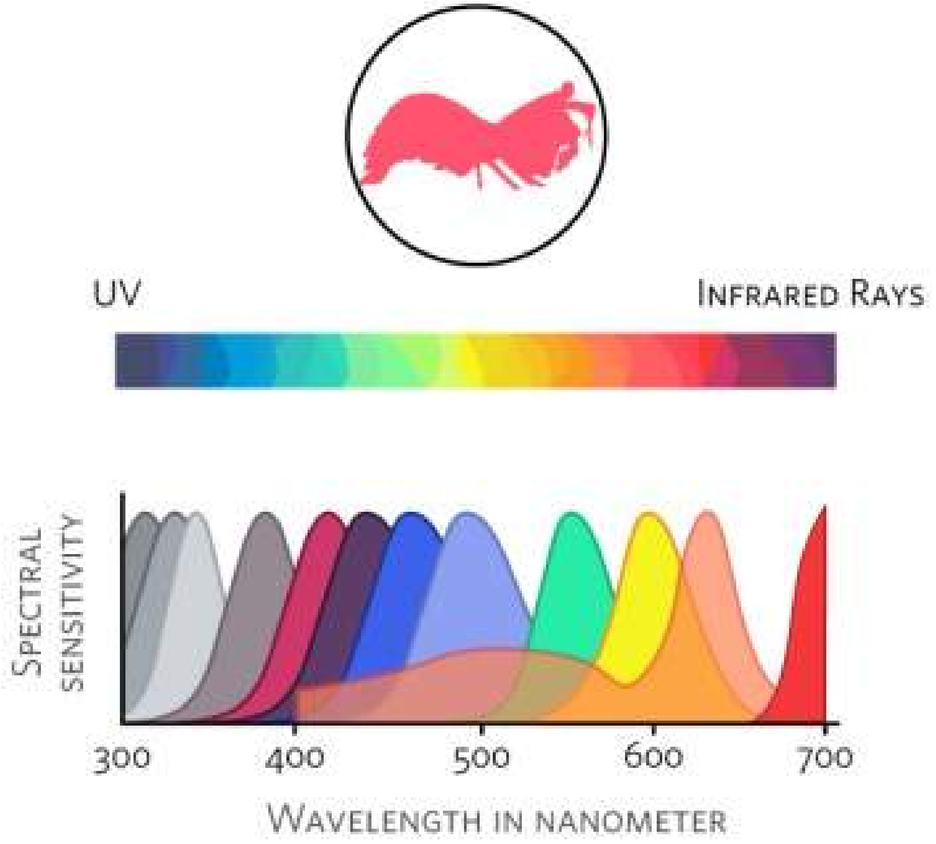

Rods
Cones
Retina
Optic Nerve
Cone Cells
Rod Cell





only 10% of all people with blindness can see nothing at all

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Tactile Tools & Raised Lines

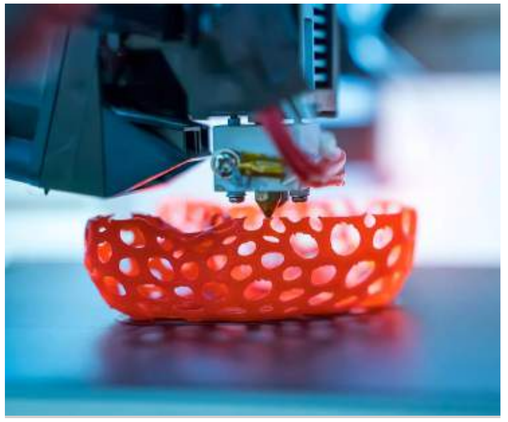
Blind artists use tools like tactile drawing boards, embossed paper, or raised lines created by styluses to feel their work.

Textures & Layers

They rely on textured materials like glue, sandpaper, or textured paints to create and feel their art.

Memory & Spatial Awareness

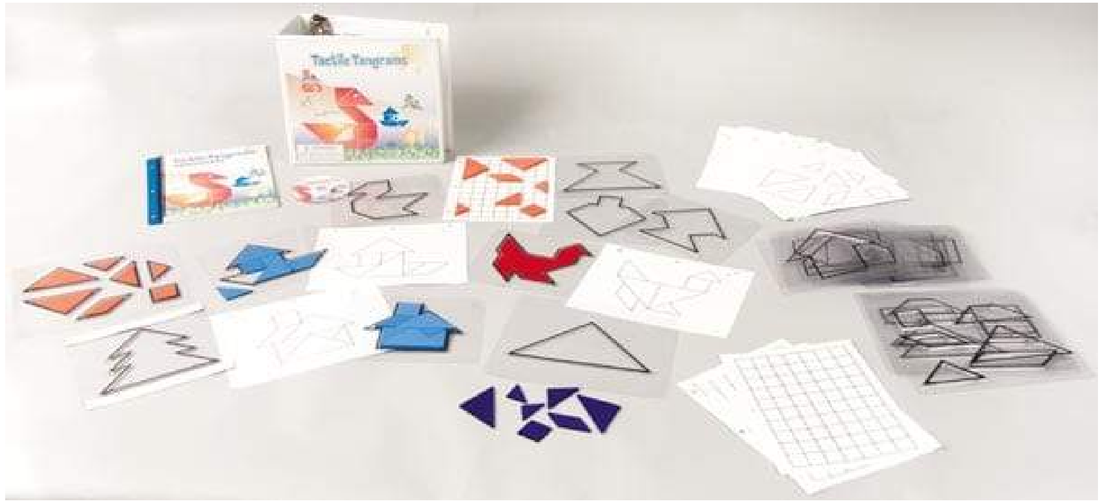
Artists visualize shapes and layouts from memory or touch and use mental mapping to compose their work.



Technology & Collaboration

Tools like 3D printing, audio feedback, and sighted collaborators help refine and enhance their creations.


MAGNA-TILES
GLOW
16
PIECE SET
LED LIGHT INCLUDED
WARNING:
WARNING:


Tactile Tangrams

A basic Braille display with 14-20 cells can range from approximately **$1,500 to $3,000.** Larger displays with 40-80 cells or more can cost anywhere between **$5,000 to $10,000** or more

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T
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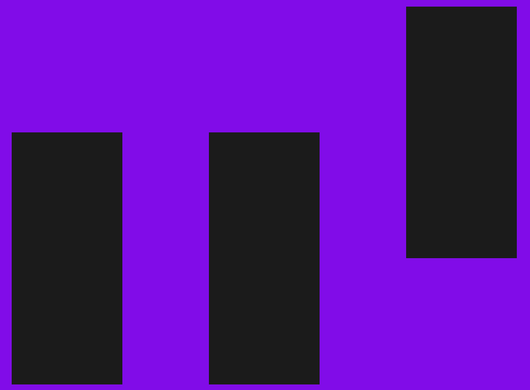
This **tactile memory game** is designed to enhance children's haptic senses—**their sense of touch**. Inspired by the remarkable ways in which individuals who are blind develop heightened abilities to recognize textures and sounds, this game aims to help children appreciate the nuances of **touch and texture**. It provides a fun and interactive way to explore **haptic feedback, texture differentiation, and shape recognition without relying on sight.**

Draw

Create your shape using the magnetic stylus on the magical sheet—be it a star, a heart, or a funky doodle. It's your moment to shine! ✨



Slide

Place your masterpiece under the pin array and watch as the pins pop up to form a touchable 3D shape! 🖌️➡️📈

Feel

Run your fingers over the raised pins and guess the shape. Can you solve the puzzle? It's a game your hands will love! 🌟


TA
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TA
CT

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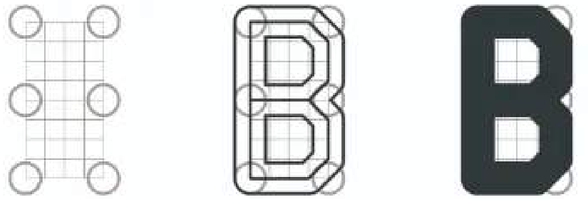
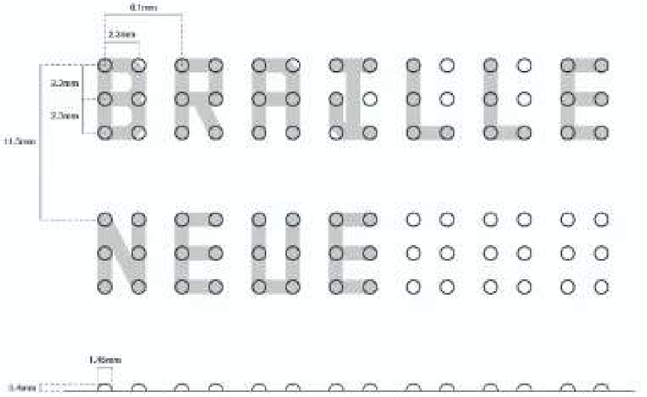
BRAILLE NEUE STANDARD

Braille Neue Standard Grid System



Reference: Braille Rule (conform to Japanese Industrial Standards)



Braille+Character

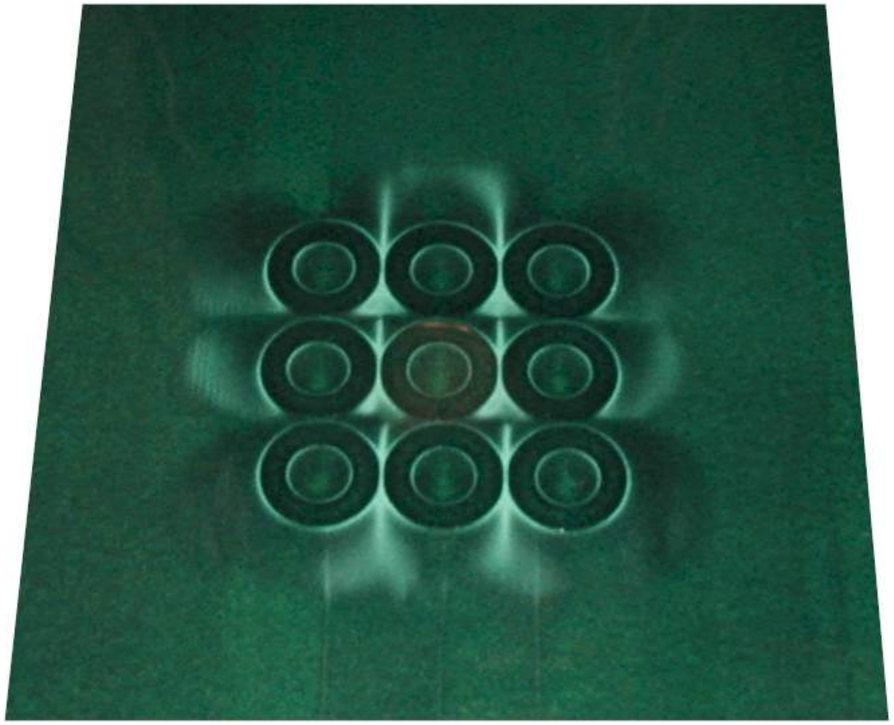
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 1 2 3 4 5 6 7 8 9 0

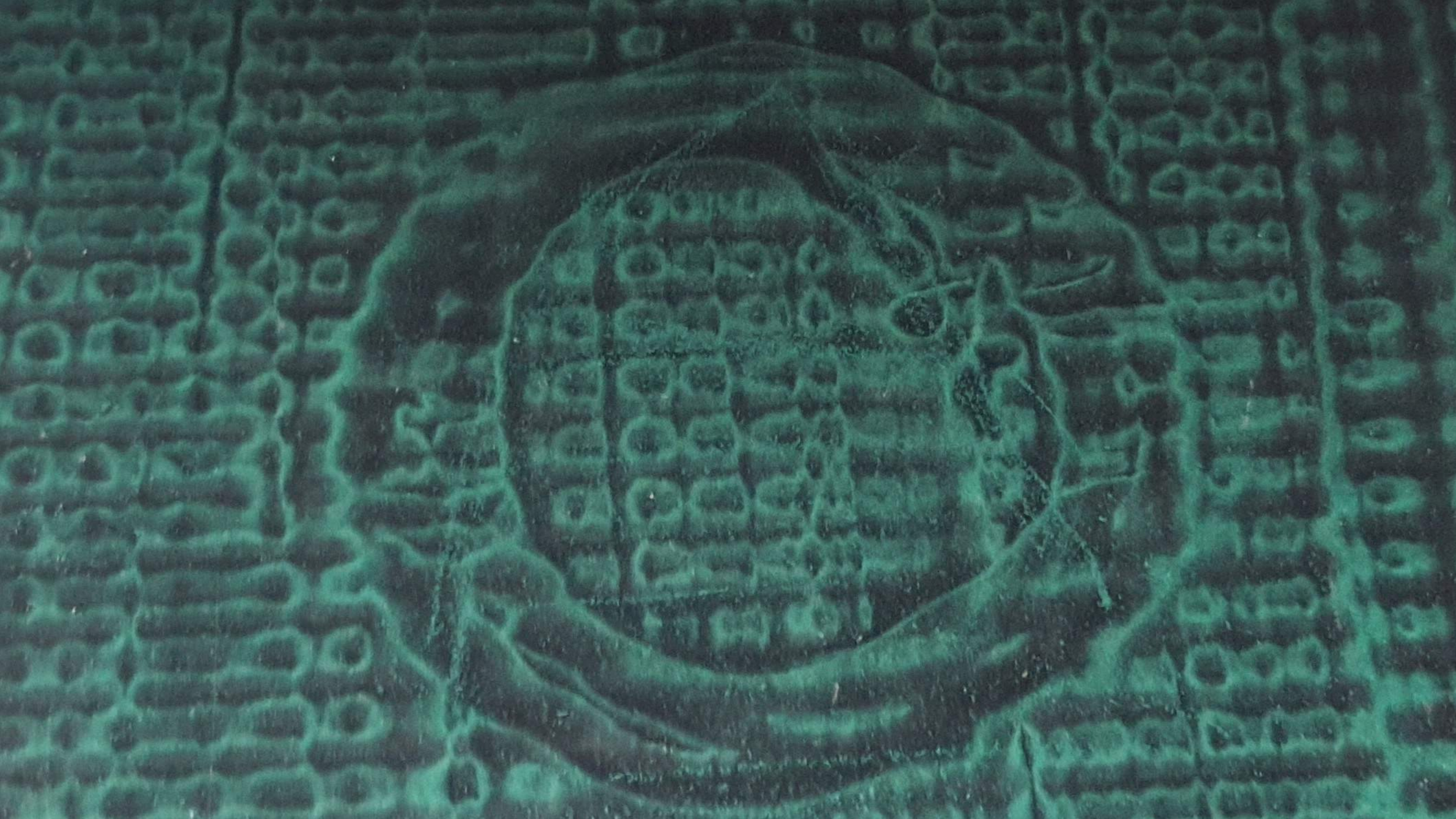
Character

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 1 2 3 4 5 6 7 8 9 0

Braille

⠁ ⠃ ⠉ ⠙ ⠑ ⠋ ⠛ ⠓ ⠊ ⠚ ⠅ ⠇ ⠍ ⠝ ⠕ ⠏ ⠟ ⠗ ⠎ ⠞ ⠥ ⠧ ⠺ ⠭ ⠽ ⠵ ⠼⠁ ⠼⠃ ⠼⠉ ⠼⠙ ⠼⠑ ⠼⠋ ⠼⠛ ⠼⠓ ⠼⠊ ⠼⠚

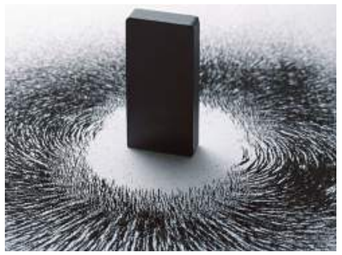




Working

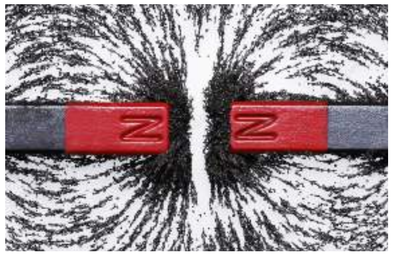
Magnetize

As the neodymium stylus glides over the magnetic sheet, it creates a localized magnetic field, transferring its energy to the sheet.



Polarize

The magnetic domains within the sheet align with the field of the stylus, creating distinct regions of magnetic polarity.



Induce

When the sheet is placed under the pin array, the polarized magnetic regions generate a repelling force against the neodymium magnets in the pins.

Feel

The raised pins provide a physical model of the drawing, translating magnetic energy into a touchable experience.

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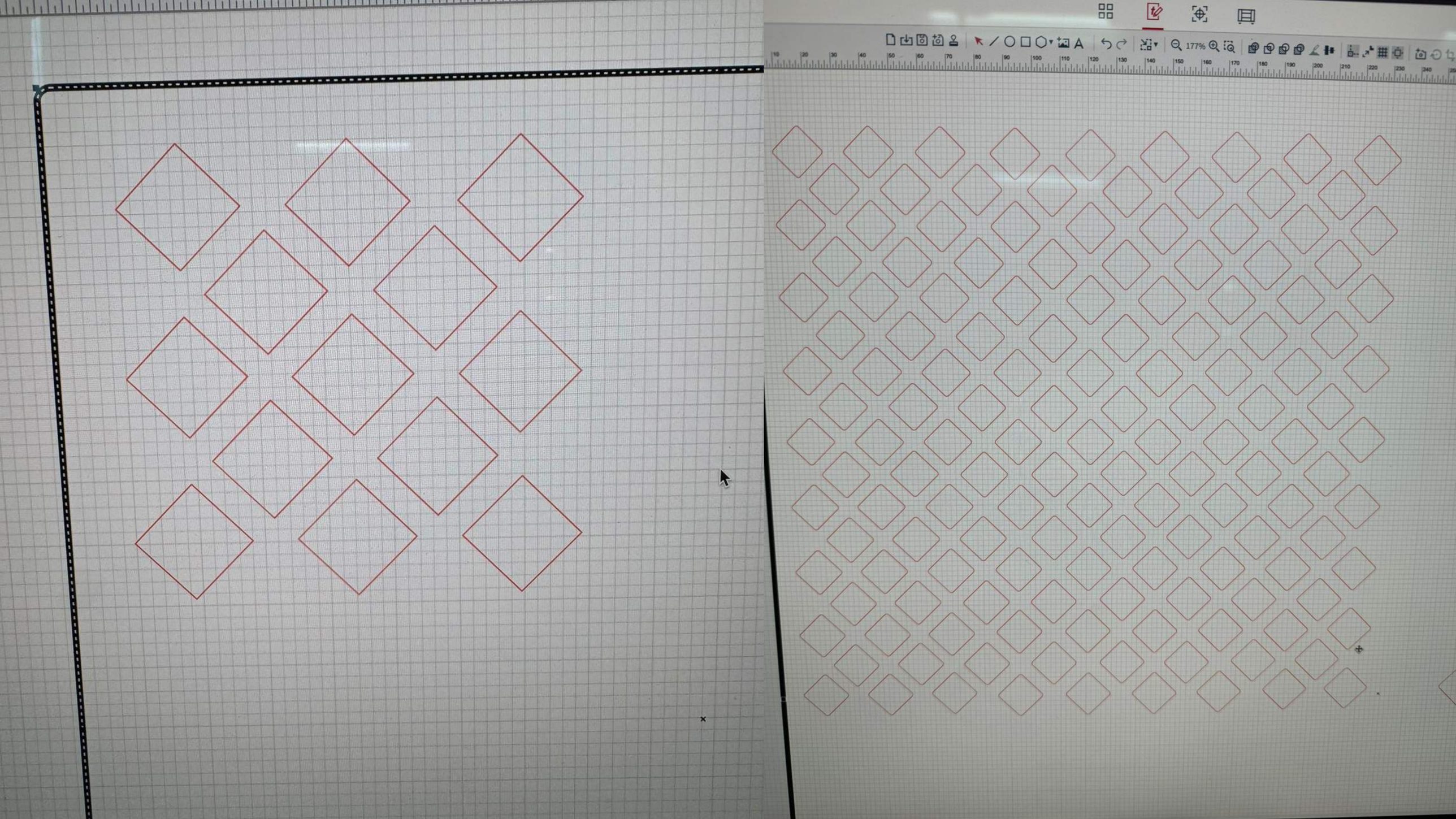
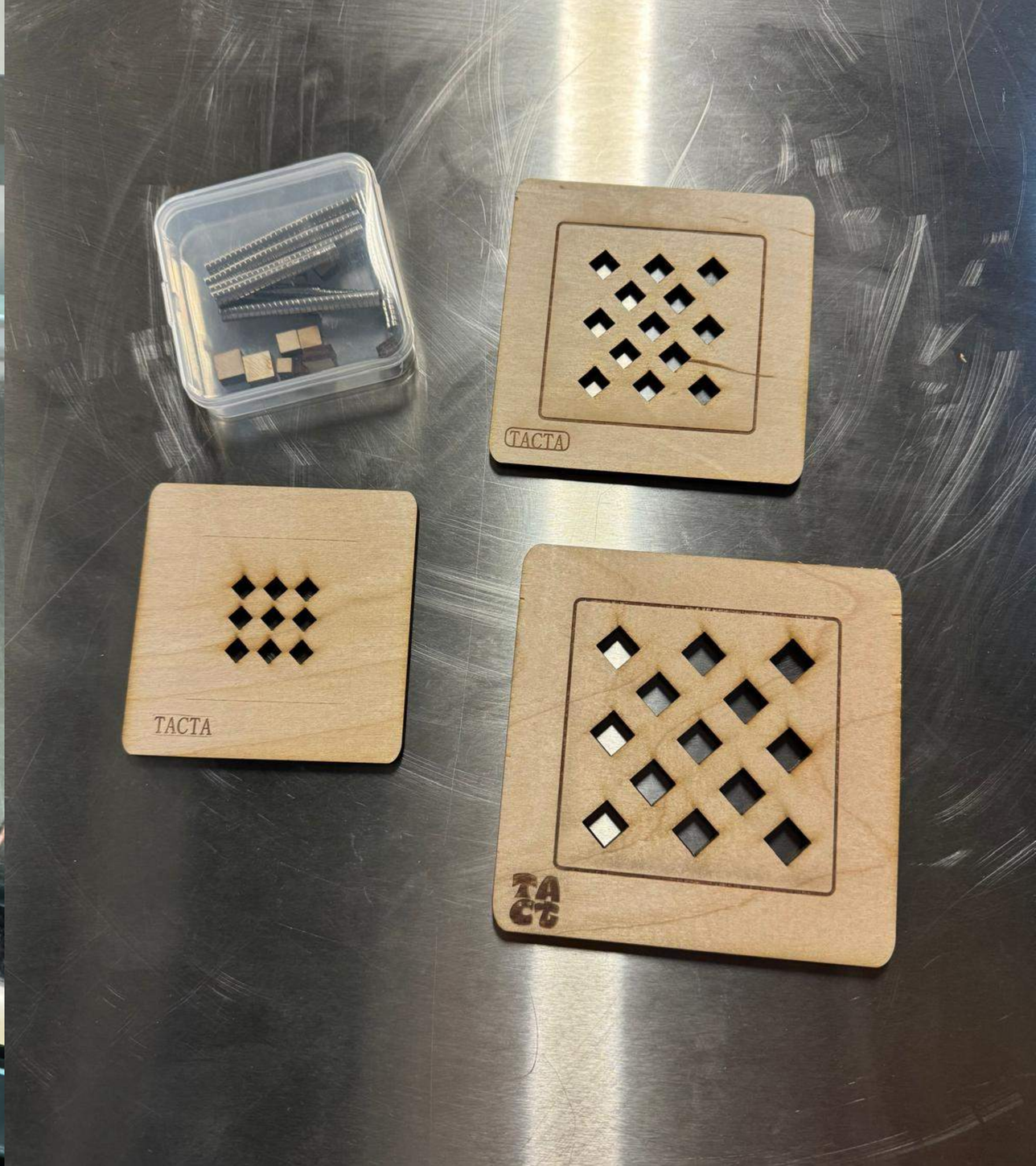
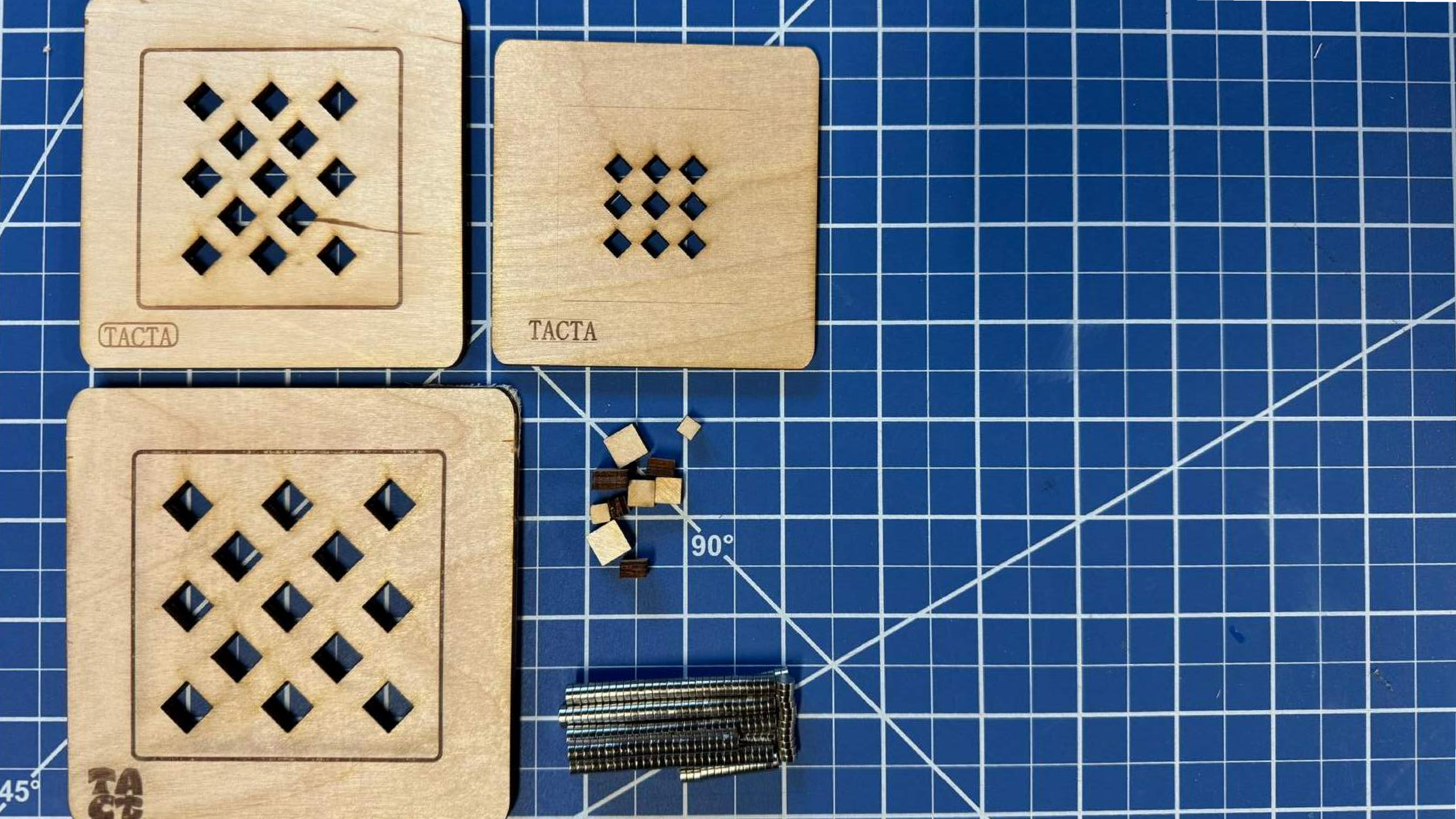
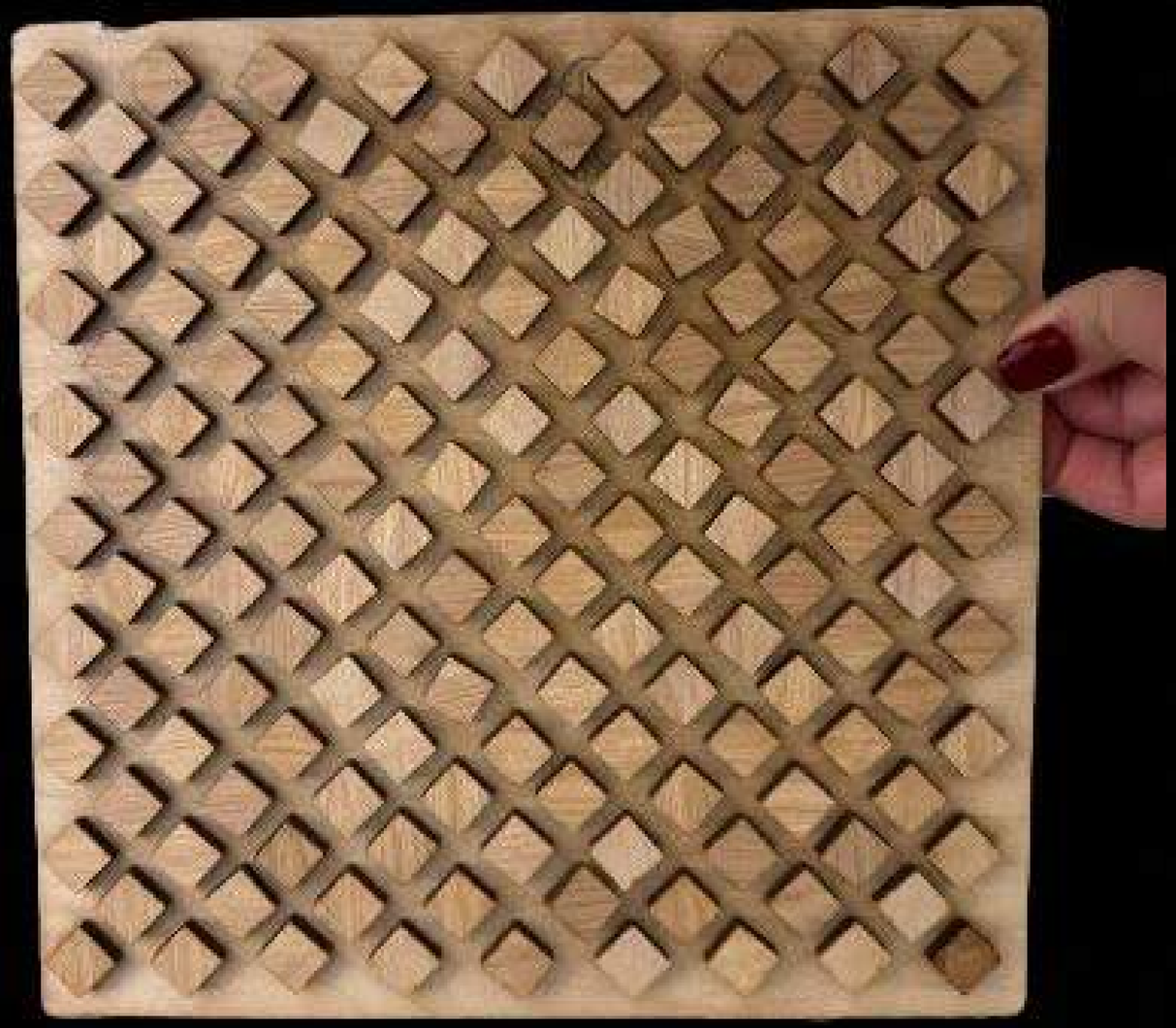
CALIPRO
STANLEY
PowerLock
EXPO

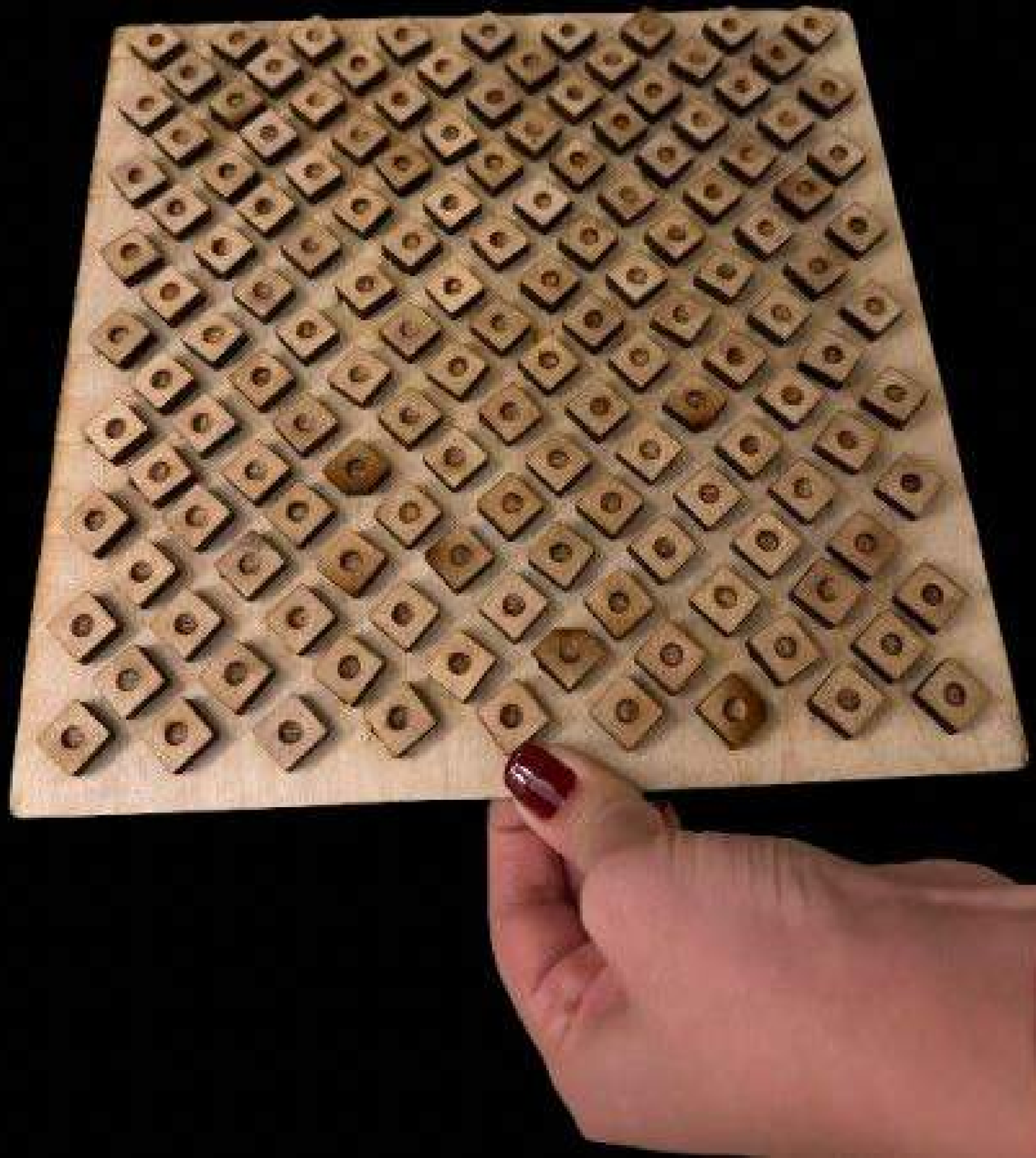



trotec / Vision
TACTA


TACTA
TACTA


TACTA
TACTA
90°
45°





Why it **failed?**

1. Failed to direct the direction of magnetic repulsion
    a. Magnetic repulsion force should be used and directed in a way to only push the pin up, but because of not having a precise laser cutter, especially because we used wood, it was moving the pin left and right rather than pushing the pin upwards

2. Weight of the pins
    a. Magnetic repulsion force was too weak to push the whole weight of the pin upwards.
    b. At max, it would tilt the pin in left or right direction

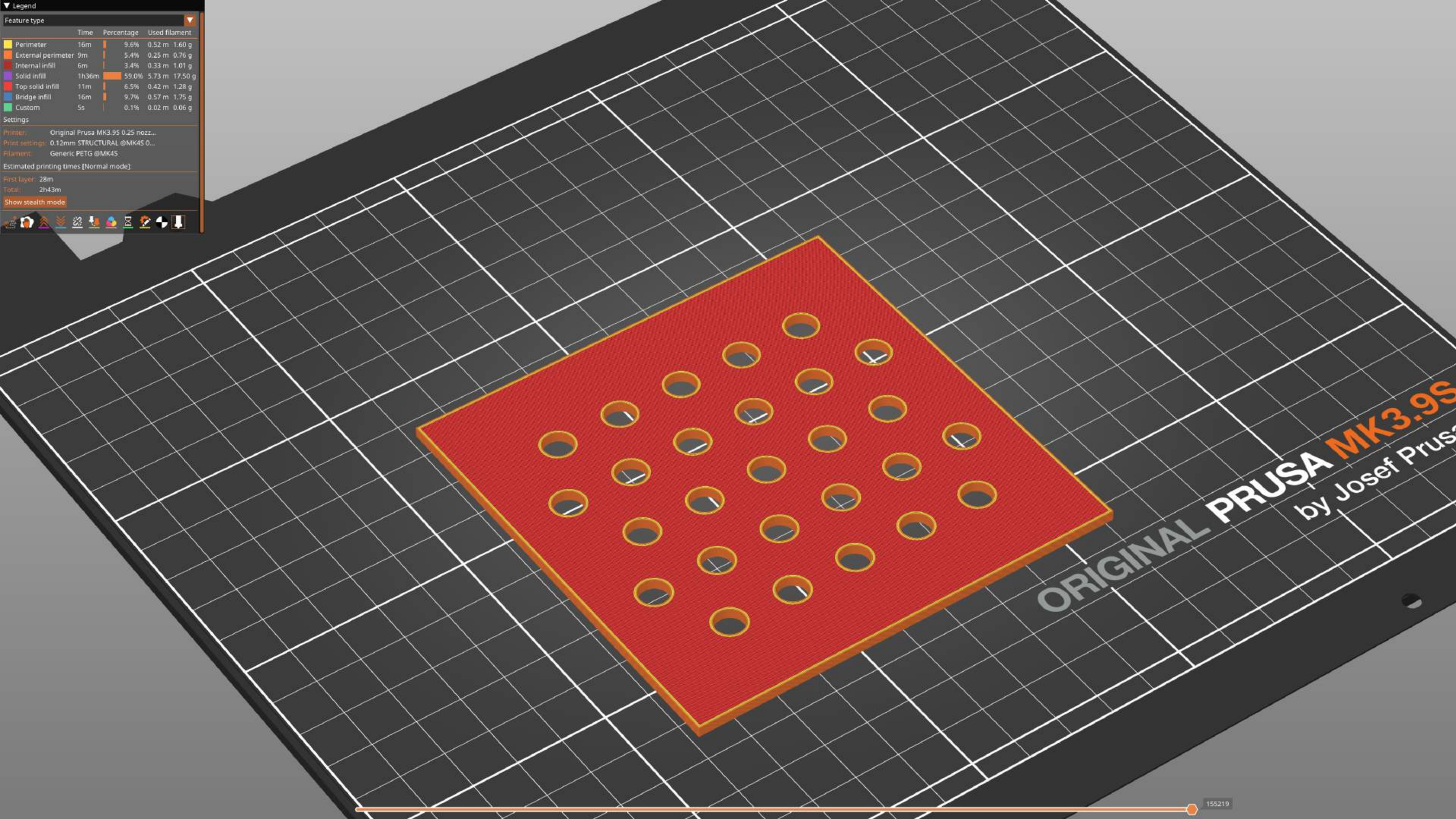
What did we decide to do **next?**

1. **Rethink the materials** we were using to get a better working prototype.

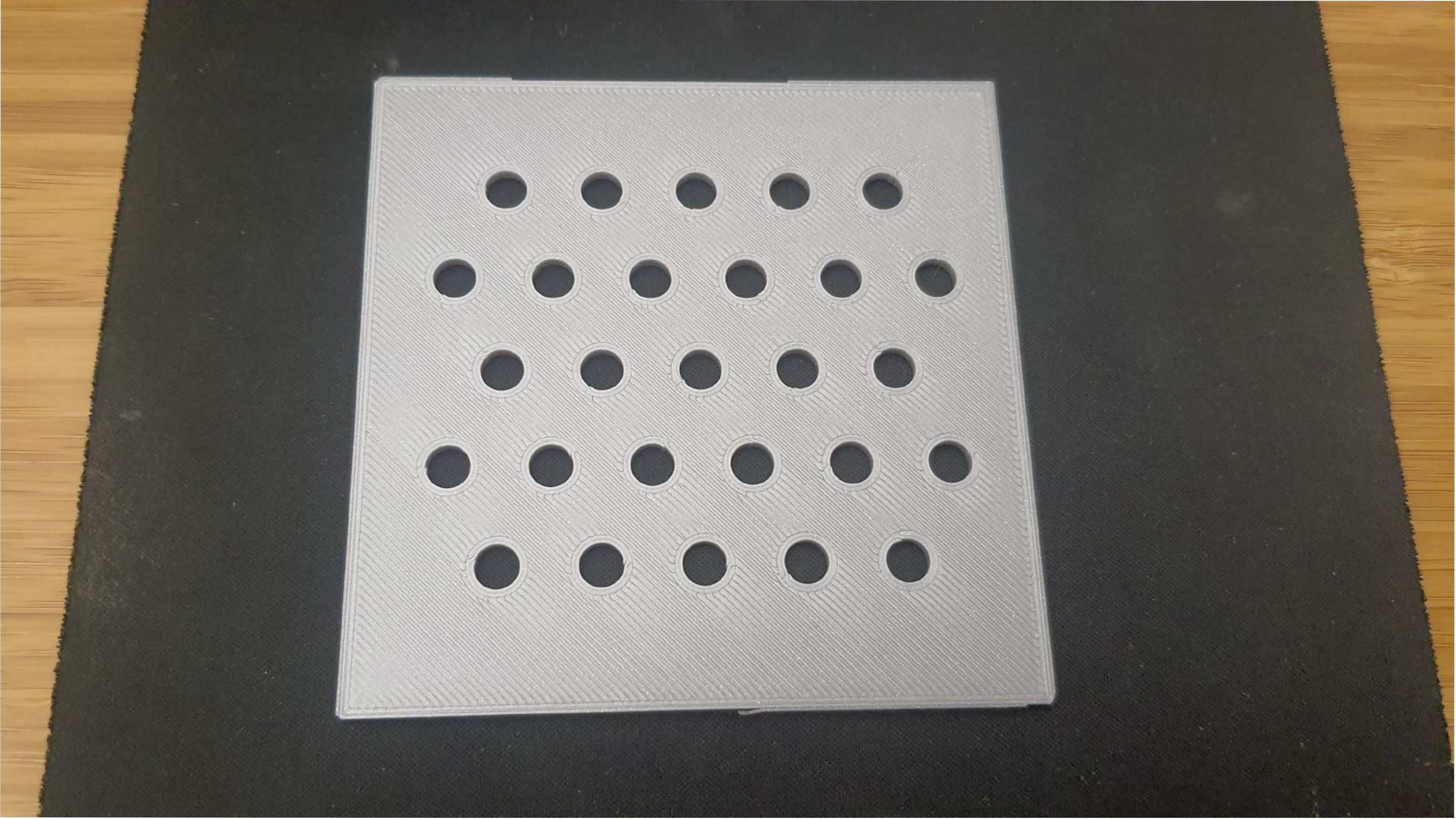
2. Work with **stronger magnets or make lighter pins.**

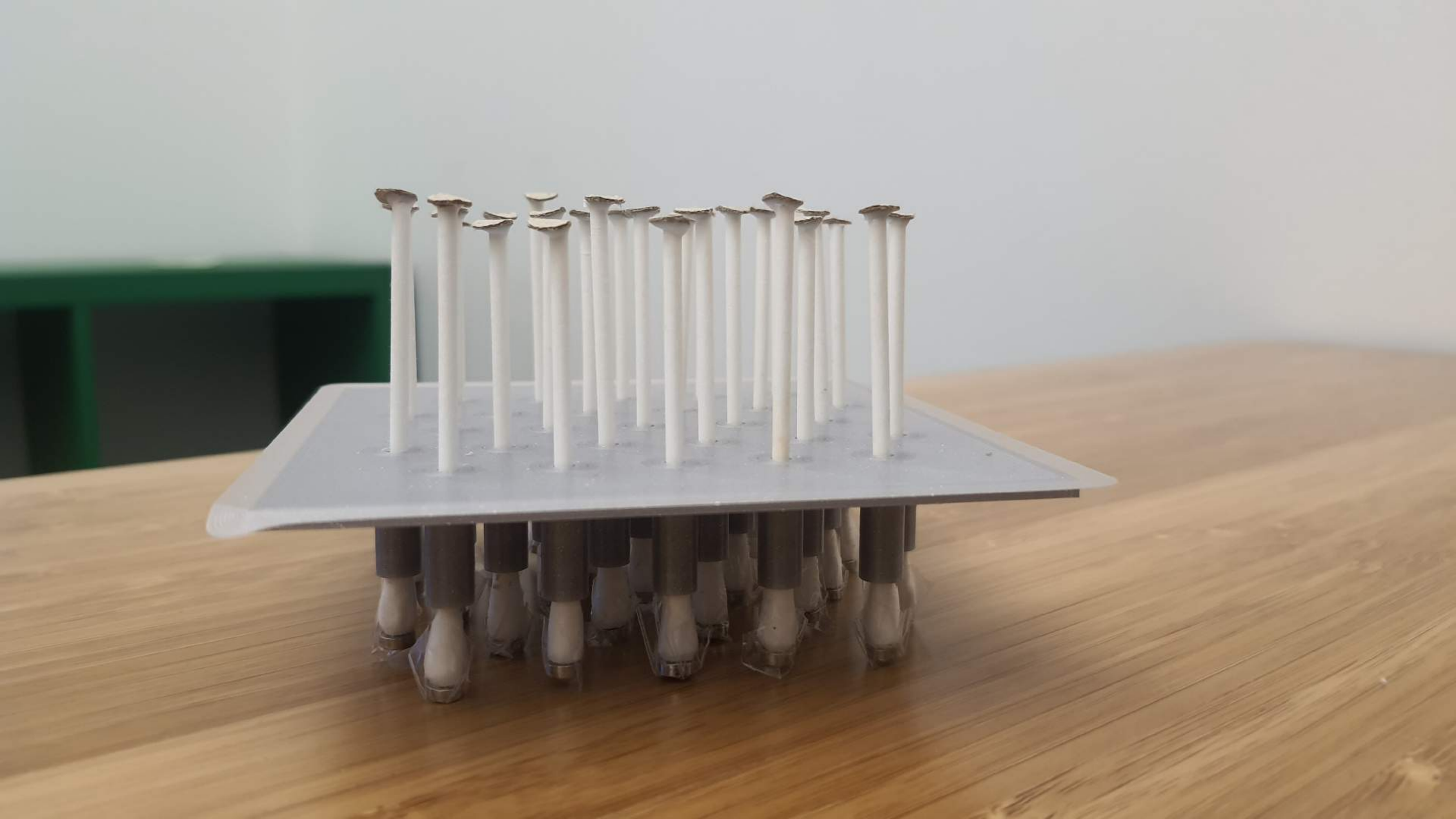
3. Use other tools to **build precise prototypes** to only direct the repulsive force to move upwards

To do this, we first built some rapid prototyping models using paper and plastic and then moved onto 3D printing to make the final prototype.


Legend
Feature type
Time Percentage Used filament
Perimeter 16m 9.6% 0.52 m 1.60 g
External perimeter 9m 5.4% 0.25 m 0.76 g
Internal infill 6m 3.4% 0.33 m 1.01 g
Solid infill 1h36m 59.0% 5.73 m 17.50 g
Top solid infill 11m 6.5% 0.42 m 1.28 g
Bridge infill 16m 9.7% 0.57 m 1.75 g
Custom 5s 0.1% 0.02 m 0.06 g
Settings
Printer: Original Prusa MK3.9S 0.25 nozz...
Print settings: 0.12mm STRUCTURAL @MK4S 0...
Filament: Generic PETG @MK4S
Estimated printing times [Normal mode]:
First layer: 28m
Total: 2h43m
Show stealth mode
ORIGINAL PRUSA MK3.9S
by Josef Prus
155219


Legend
Feature type
Time Percentage Used filament
Perimeter 1h16m 27.3% 2.22 m 6.78 g
External perimeter 43m 15.5% 1.21 m 3.69 g
Solid infill 1h36m 34.6% 5.73 m 17.50 g
Top solid infill 11m 3.8% 0.42 m 1.28 g
Bridge infill 16m 5.7% 0.57 m 1.75 g
Custom 5s 0.0% 0.02 m 0.06 g
Estimated printing times [Normal mode]:
First layer: 30m
Total: 4h38m
Show stealth mode
ORIGINAL PRUSA MK3.9S by Josef Prusa
17.96
(149)
0.20
(1)
Print settings:
0.12mm STRUCTURAL (modified)
Filament:
Generic PETG
Printer:
Original Prusa MK3.9S 0.25 nozzle
Supports: None
Infill: 0%
Brim:
Name
Editing
Layers and Perimeters
Generic-Box
Shape-Cylinder
Group manipulation
Translate: 0 0 0 mm
Rotate: 0 0 0 °
Scale: 100 100 100 %
Size [World]: 100 100 25 mm
Inches
Sliced Info
Used Filament (g) 31.05
Used Filament (m) 10.17
Used Filament (mm³) 24452.67
Cost 0.86
Estimated printing time:





Final prototype video here :

https://drive.google.com/file/d/1GwsN-NEBm5TXX8vq3vi7o7drdUJ_D5Aq/view?usp=sharing