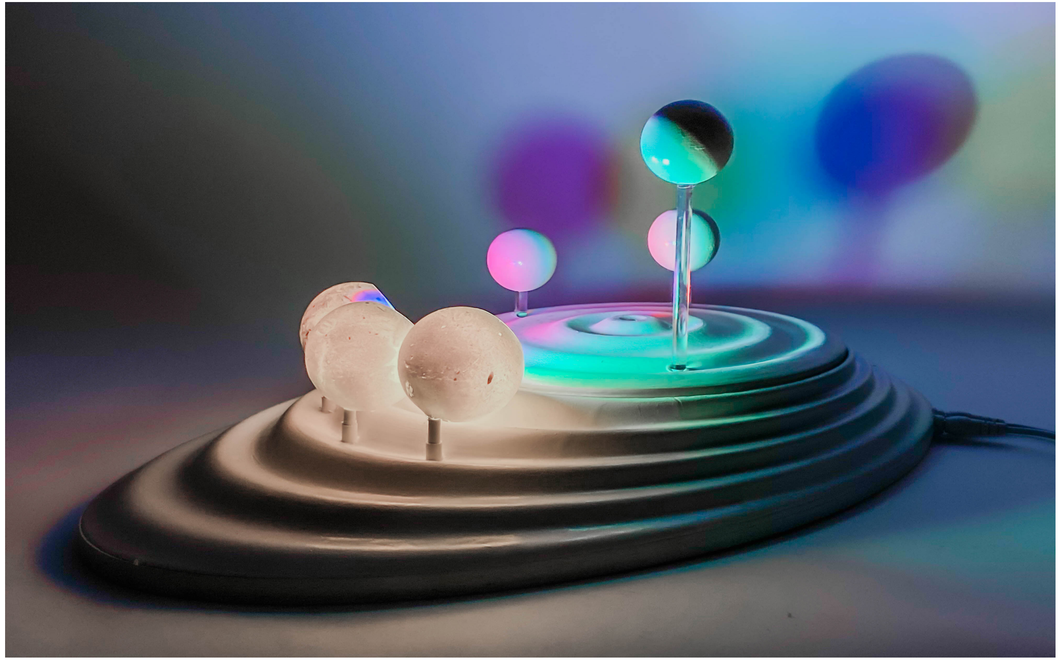
VIOLETTA JUSIEGA

design portfolio



INTERSTELLAR INSTANCES

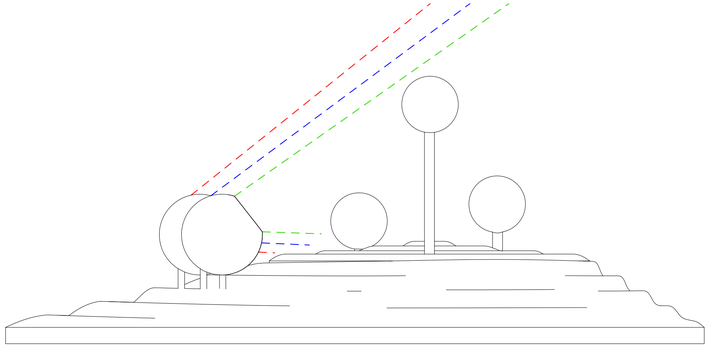
Course - 4.031 Intro to Design
Insturctor - Marcelo Coelho
Fall 2019

OVERVIEW Functioning as both a light and a "clock", this project was inspired by astronomical phenomenon. By shining red, green, and blue lights at spheres attached to a rotating disc, colorful shadows dance on the walls. Once per rotation the spheres align to form a black shadow. This black shadow marks the passage of time, at least relative to this device.

MATERIALS
3D Printer
LED Lights
Acrylic Rods
DC Motor

TECHNOLOGIES
Rhinoceros
Grasshopper
Python Code
Arduino

The objects shines colorful light at a wall while the disc of spheres is spinning. Each photo here is a different point in time in the disc rotation. The rightmost photo shows the convergance of all shadows, which happens once per rotatation, creating a black shadow.



Side view of the object. Three spheres on the left side of this diagram shine red, green, and blue lights onto three spheres that sit on acrylic rods on top of a spinning disc.

This is my favorite project that I've ever done because I was able to incorporate so many of my own interests as well as use some of my favorite techniques for design and fabrication. The object itself was inspired by my deep interest in outerspace as well as lights and colors.

The base of the light has ripples which represent gravitational waves. To create the base I used Rhino and Grasshopper to parametrically derive the exact shape that I wanted. I then 3D-printed the base in two connecting halves (since the whole base wouldn't fit on the printer bed). I then covered the 3D print with a thick clear varnish in order to smooth out the lines created by the printer and finally spray painted everything in white.

The spheres rotating on the platform are like planets, and at one particular alignment we get to experience a sort of eclipse of their shadows. I made my own Python script in order to calculate how the spheres should be positioned. I enjoy using code to help solve interesting design problems.

Finally the lights and the spinning platform are powered by an arduino. These wires and parts are all concealed underneath the disc platform, and in order to receive power there is a voltage connection on the side of the object.

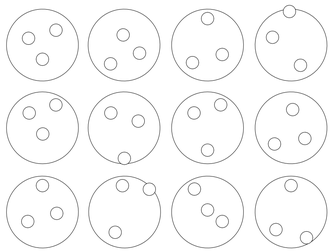
PSEUDO CODE

I used a python script in order to find a configuration of circles that would create a dark shadow only once per rotation. Below is the pseudo code for my process.

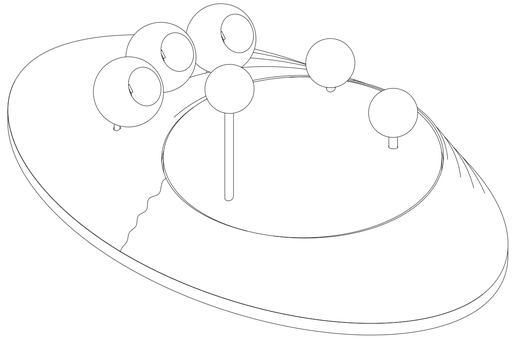
```
fixed variables :
    light_positions // for red, green, and blue lights
    wall_distance // where the shadows will fall
    disc_position // area that the spheres can be placed
    light_rays // direction that the lights are pointing

calculate :
    ray_segments // segments of the light ray that intersect with the disc

iterate : // go down each segment by some unit length
    for each r_pos on r_ray_segment:
        for each b_pos on b_ray_segment:
            for each g_pos on g_ray_segment:
                check_sphere_combo(r_pos, b_pos, g_pos)

function check_sphere_combo(r, b, g) :
    if each shadow intersects on the wall : // creating a dark shadow
        if the shadows do not all intersect again upon rotation of disc :
            then (r, b, g) is a desired configuration
```

RESULTS

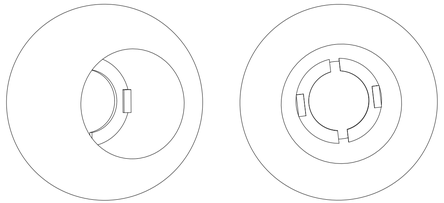
The code generated a collection of configurations that satisfy my specifications. I chose which one to use by simulating what their light patterns would look like in Rhino.



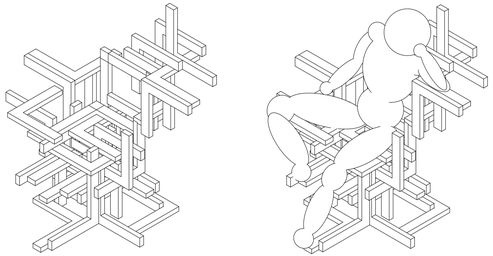
Of these possible configurations, which also have a set z-position for each sphere, I chose the one highlighted in the bottom right.



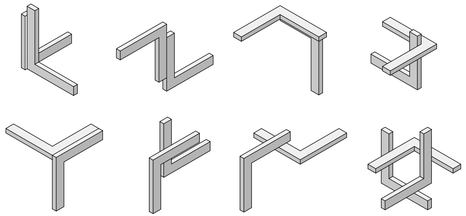
Angled view of the object with a clear view of the disk.



The lights were contained in 3D printed spheres I desigend to match the moving spheres. These containers also had special bases and hooks to keep the lights in place. Colored filters were then attached to the opening.



The chair was designed around this casual pose. This created a juxtaposition between needing the chair to force this "comfy" position but using the rigidity of the L brackets.



Though the chair may look chaotic, the way that the L-brackets intersect can be broken down into these eight types of connections.

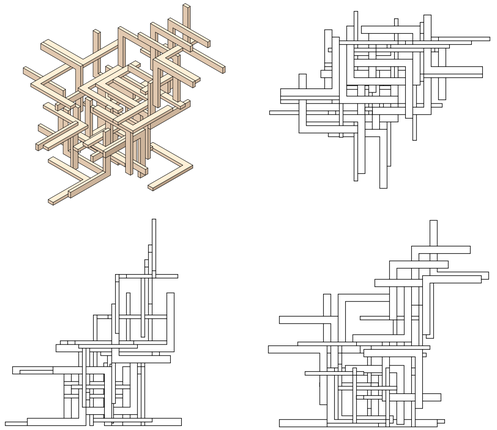
(UN)COMFY CHAIR

Course - 4.031 Objects and Interactions
Insturctor - Marcelo Coelho
Fall 2019

OVERVIEW Using the idea of simple material components displayed in Enzo Mari's Autopregazzione, this chair was designed using uniform L-shaped brackets as the building blocks. With this I explored how far I could stray from the original shape of the bracket while creating a chair that supports (what is usually) a very relaxed seating position.

MATERIALS
2 x 4 Lumbar
Wood Glue
Nails

TOOLS
Hand Saw
Miter Saw
Nail Gun

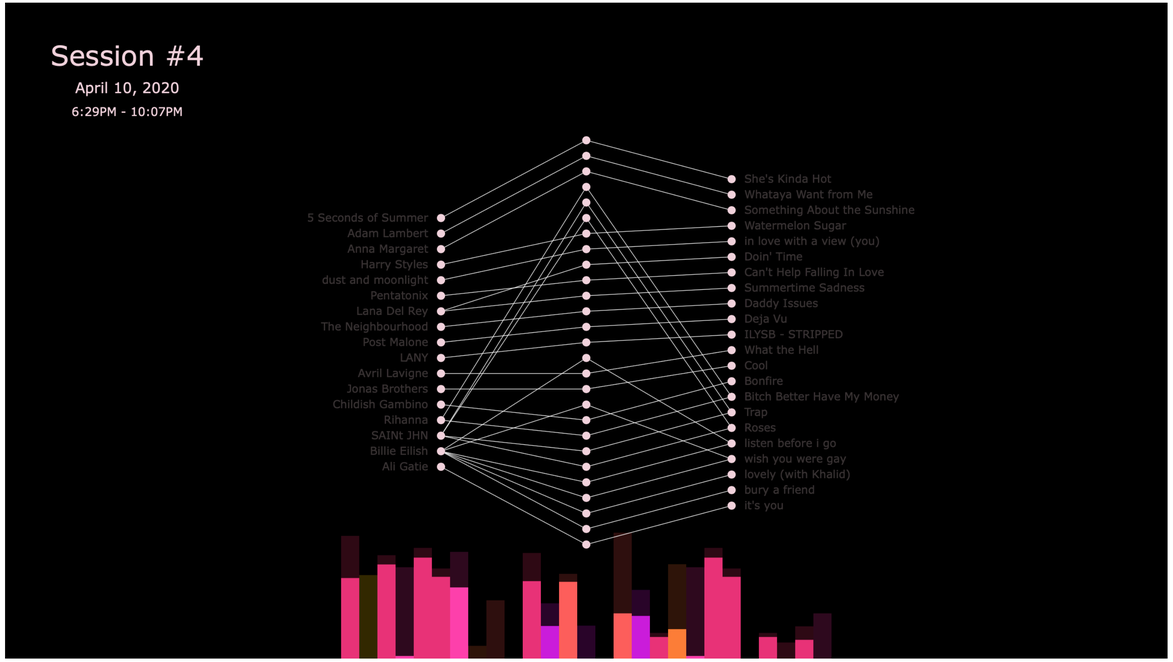


The above drawings (left to right, top to bottom) include an isometric, top, side, and front view of the chair.

This chair was designed over many iterations in Rhino before I constructed the final piece. The final design, however, was dificult to create in real life because of how complicated it was. I had to break down my design into pieces and really create a game plan before putting pieces together. Though at first I used primarily wood glue to keep pieces together, I transitioned to using a combination of nails and glue to speed up the process.

The end product was a little fragile but I was still able to successfully sit in the chair with my full weight. I really enjoyed seeing how complicated this project could get given such a simple base component. The goal of using this chair for a comfortable sitting position helped reign in and direct some of the chaos towards a more meaningful design.

Final images of the chair.

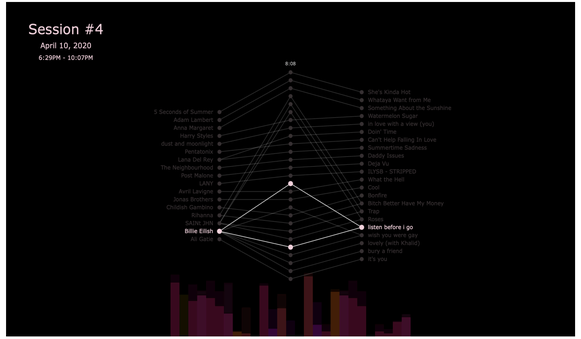


MUSIC SESSIONS

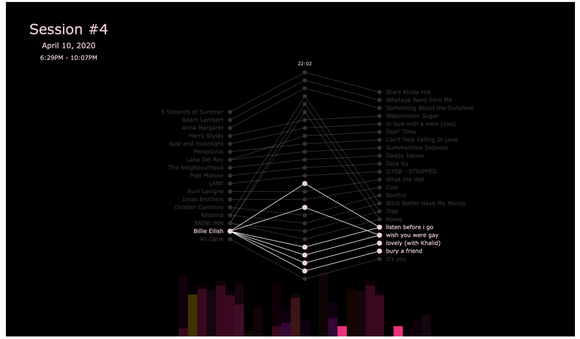
Course - 4.032 Intro to Design
Insturctor - Ben Fry
Spring 2020

OVERVIEW This data visualization was inspired by my own listening habits, specifcally my tendancy to listen to songs on repeat. Here I group the songs I listen to into "sessions" (periods of time when I listened to music consecutively). Here I map artist and song title names to the instances that I listened to them. Live demo at - *https://vjusiega.github.io/music-sessions/*

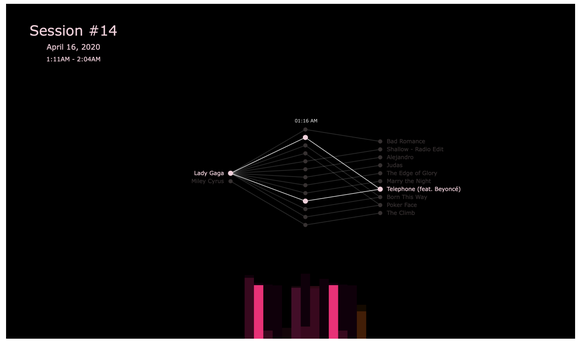
TECHNOLOGIES
Processing.js
Spotify API



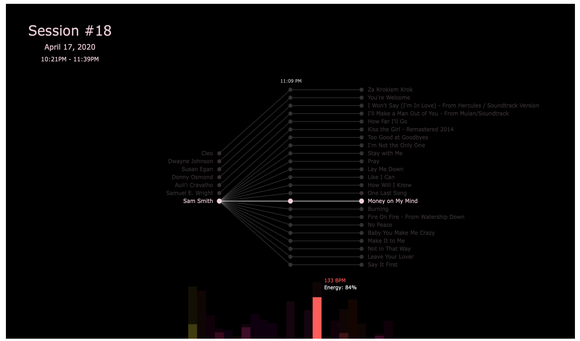
Highlighting a circles in the middle column reveals the track info (name and artist) as well as the time I listened to the song.



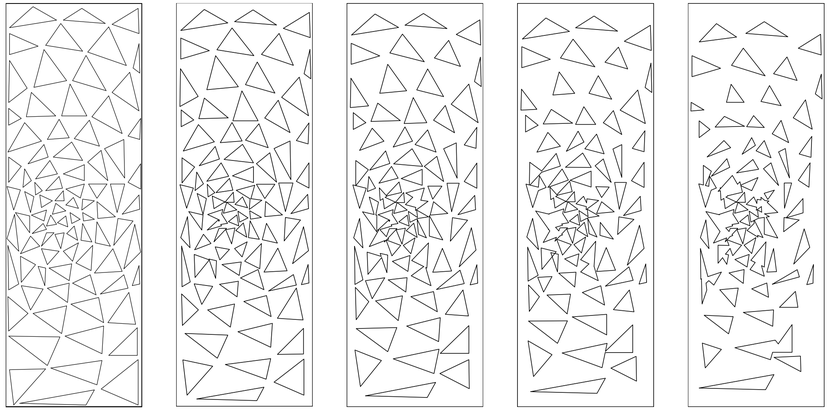
Highlighting an artist names reveals all the songs by the artist in the session as well as all the instances that the artist was listened to.



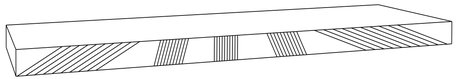
The bottom bar is an animation correlating to the song's BPM and energy. When a song is highlighted, the corresponding bars are highlighted as well.



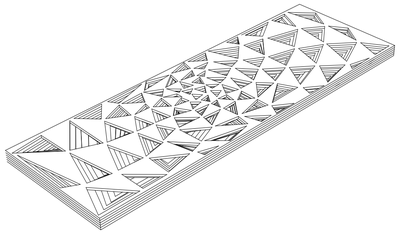
Placing the mouse over the individual bars will highlight the corresponding song as well as reveal a tooltip that gives detail to the song's metrics.



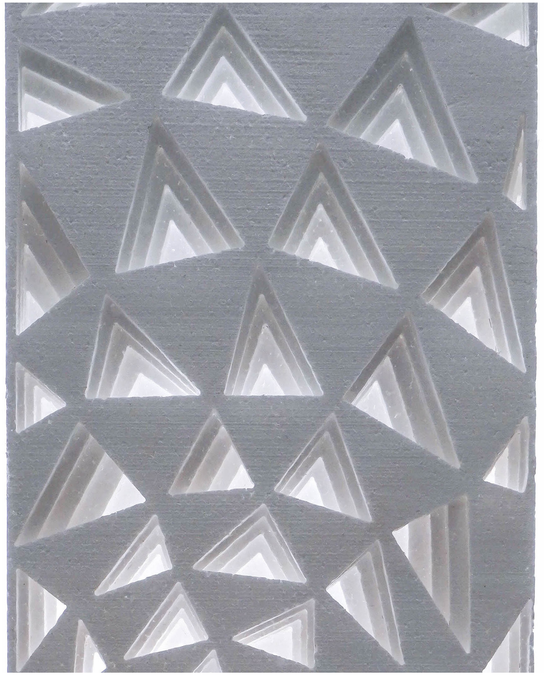
After designing the top layer in Rhino, I created the next layers by shifting each triangle in the direction that I wanted light to come through at that point. This was a tedious process as I had to make sure that the triangles did not overlap or interefere with one another when layered. Once I designed these templates I used a laser cutter to create stencils out of MDF that I then used to easily cut through foam.



The angle at which light can go through the screen follows the above transitions from a side view. This pattern is the same on all length-wise cross-sections.



The steps visible in the layer design give a visual indication that the holes cannot be looked through straight on. Depending on the angle at which the screen is viewed, different parts can be looked through.



Some of the steps of the screen reflect light on their borders, depending on how the light hits the edges of the steps. This created a surprising but very pleasing affect that highlights the triangular patterns within each triangle.

ANGLED VIEWS

Course - 4.021 Intro to Design
Insturctors - Skylar Tibbits &
Maroula Zacharias

OVERVIEW Made from 5 layers of hand cut styrofoam, Angled Views is a screen that uses a stepped triangular pattern to let light through at different angles. These angles create sight lines that converge at the center, creating a radial effect of the light.

MATERIALS
Styrofoam

TECHNOLOGIES
Laser Cutter
Hot Foam Cutter
Rhinoceros