

Art, Lights and Steel

or

How I Spent My Sabbatical

Philip Levis
CSI07E, Autumn 2021

Let's Make Something

- I wanted a tangible result: I could point at and say "I made this"
- I know about embedded electronics, but not much about mechanical engineering such as steel, polymers, stress/strain, CAD, FEM, etc.
- Idea: spend a year engineering an art project for Burning Man
 - Learn about the mechanical side of making
 - Bring together a small team
 - I'll look back in 20 years and be happy I spent a year this way

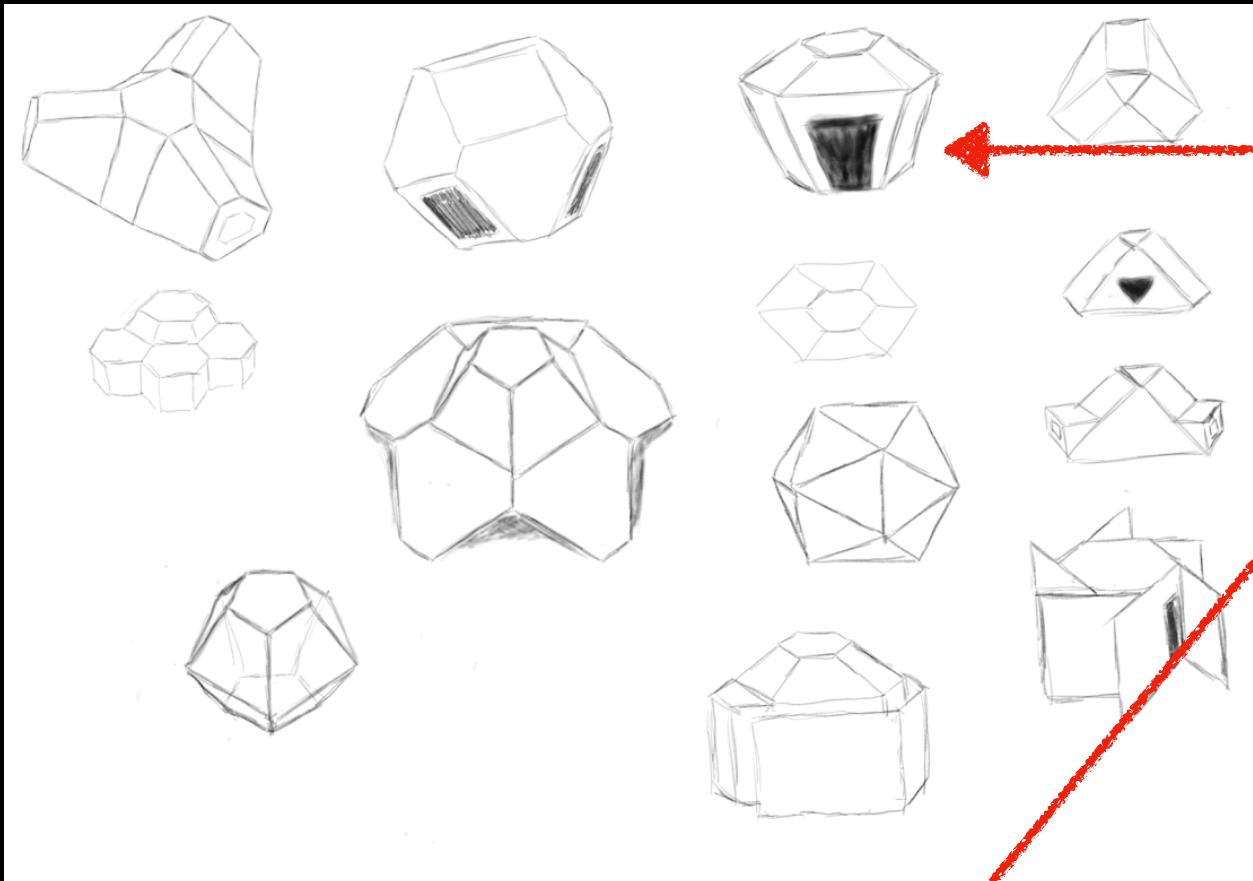
Inspirations and Goals



- Jewel box: a small structure you can go inside, lots to discover
- Mystery: it shows, not tells, it's up to you to decide what it means

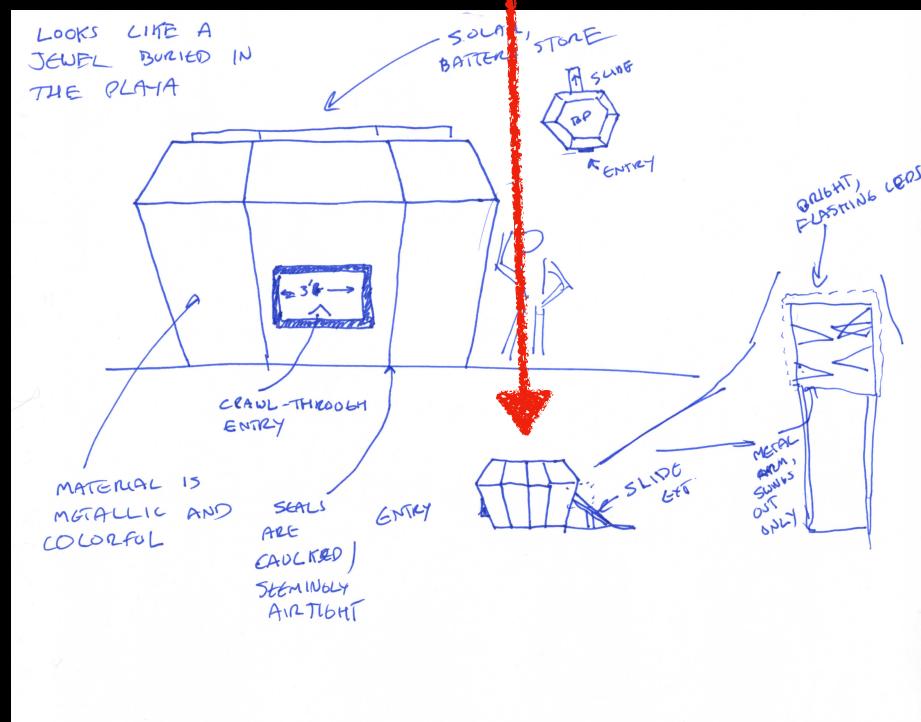
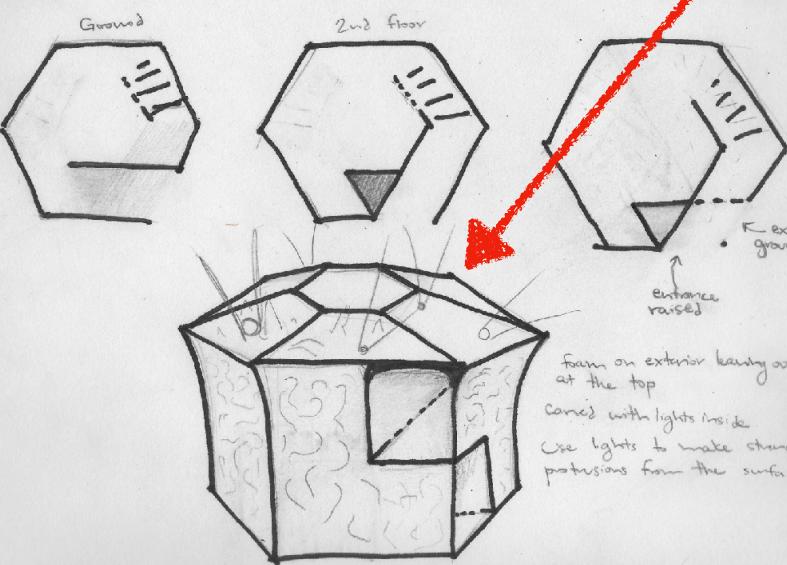
The Dwelling

- A strange looking structure out deep in the desert
- Inside, everything seems strange: strange angles, strange symbols
- This is a home, but *whose*?
- A journal, with pages of engraved metal, tells a story
- Filled with all kinds of strange and incongruous objects

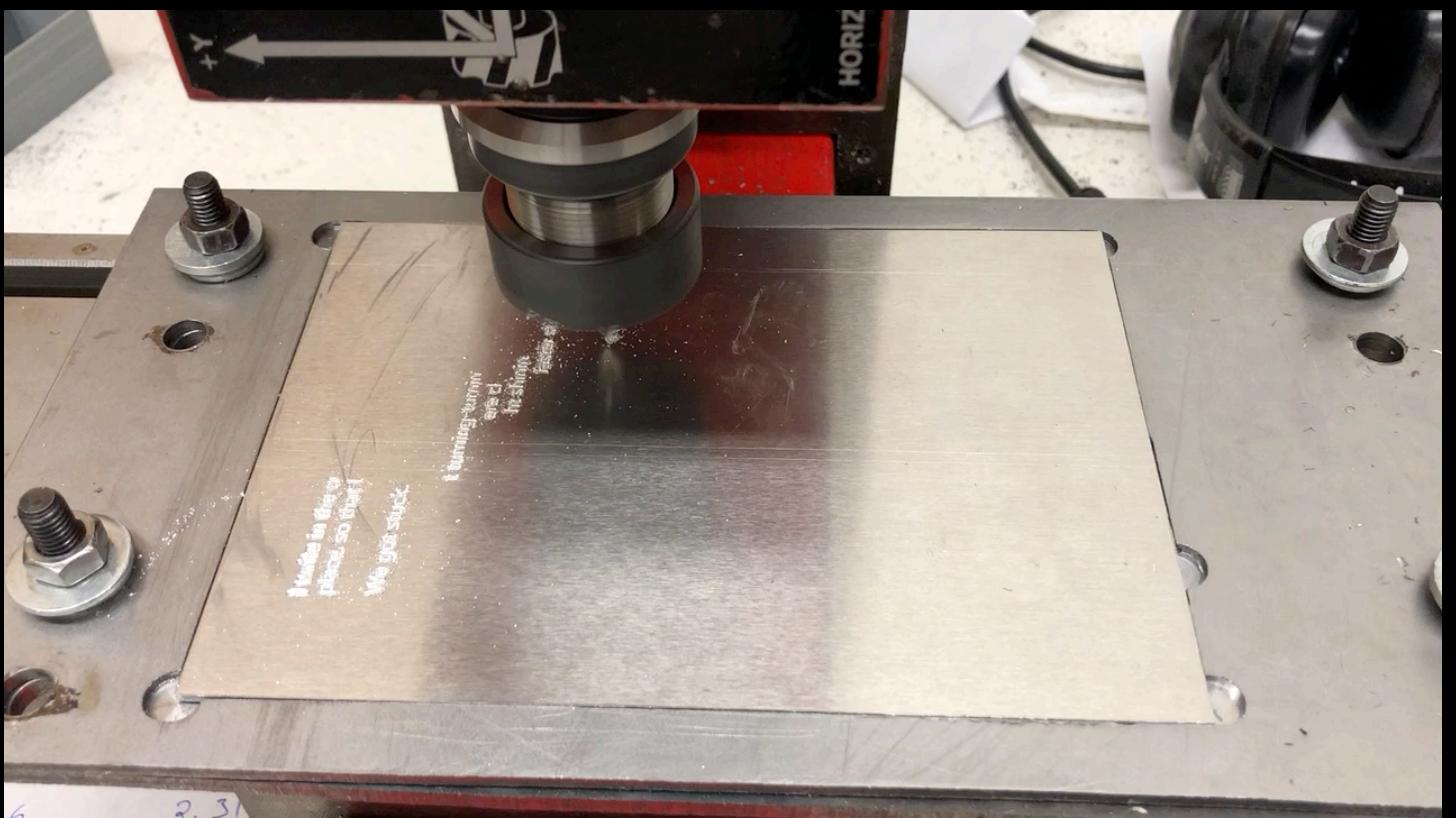


Everyone gravitated towards this shape

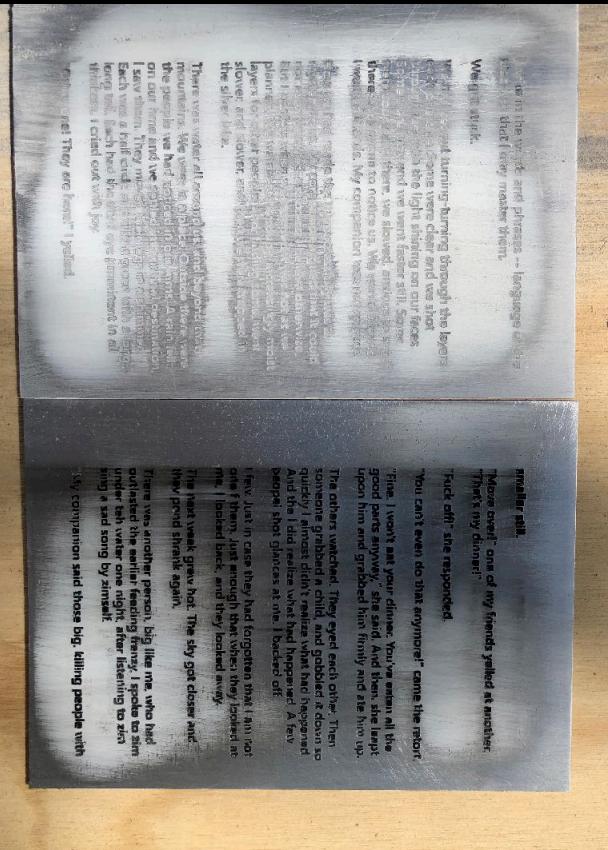
partially truncated hexagonal symmetric right bipyramid



Journal



6061-T6 Aluminum, 12 gauge, mild steel fixture
3-axis CNC mill
Letters carved with 60 degree v-mill, depth of .005".
Painted white, colored with iridescent pigment powder.
Letters black iridescent pigment in mineral oil, sealed with varnish.
CAD, CNC milling, aluminum, steel, feed rates,



Alucobond



Arrives in 16'x5' sheets via LTL freight after about 6 weeks of adventure...

<https://thedwelling2019.blogspot.com/2019/05/the-alucobond-odyssey.html>

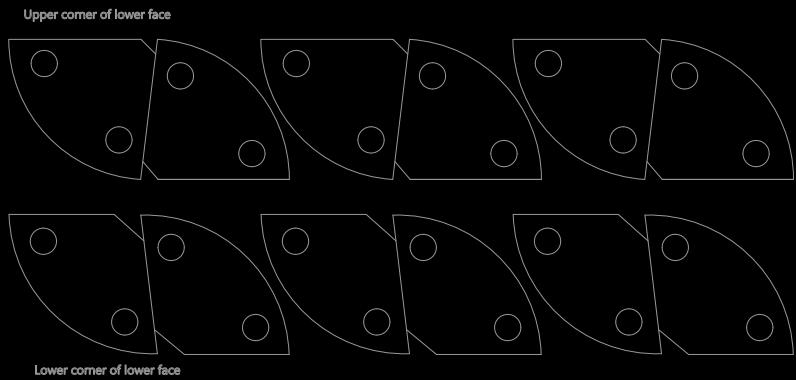
The Frame



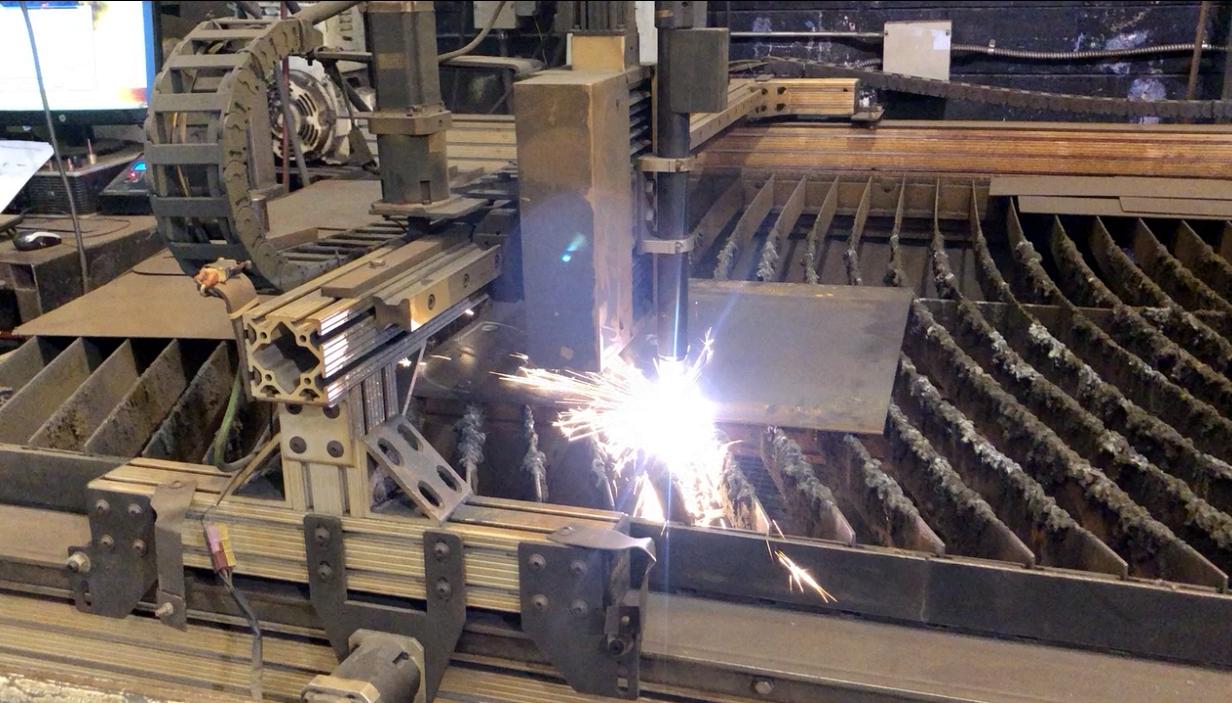
SCH80 and 2.5" square pipe connectors
1.75" OD 0.25" wall A513 tube struts
600 lbs of steel
CAD, FEM (simulating loads), Cutting, Drilling, Welding, Machining



The Flanges



Attachment points to frame
1/8" mild steel plate
CAD, plasma cutting, grinding, welding



Wooden Blocking



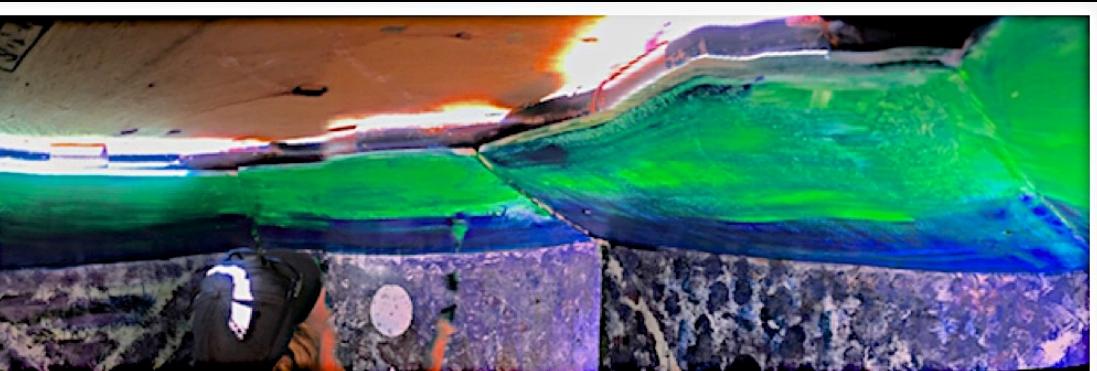
3x3 beams, 3/4" plywood, 1 1/8" plywood, rectangular steel tubing
Woodwork, machining

Alucobond Faces



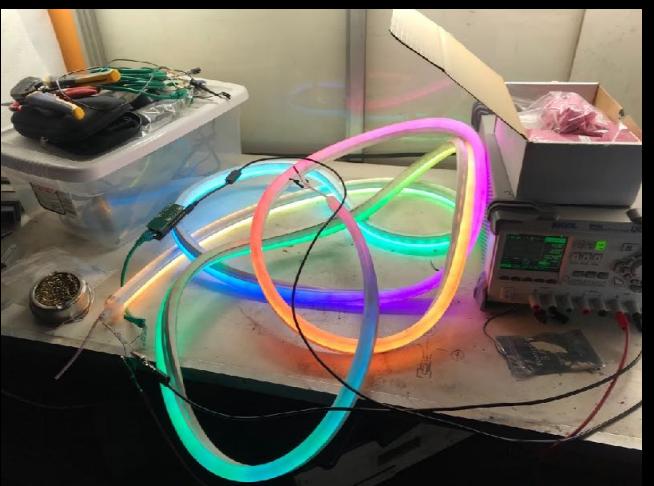
Contact cement, contractor's glue, lots of clamps
Lots of manual labor

Interior

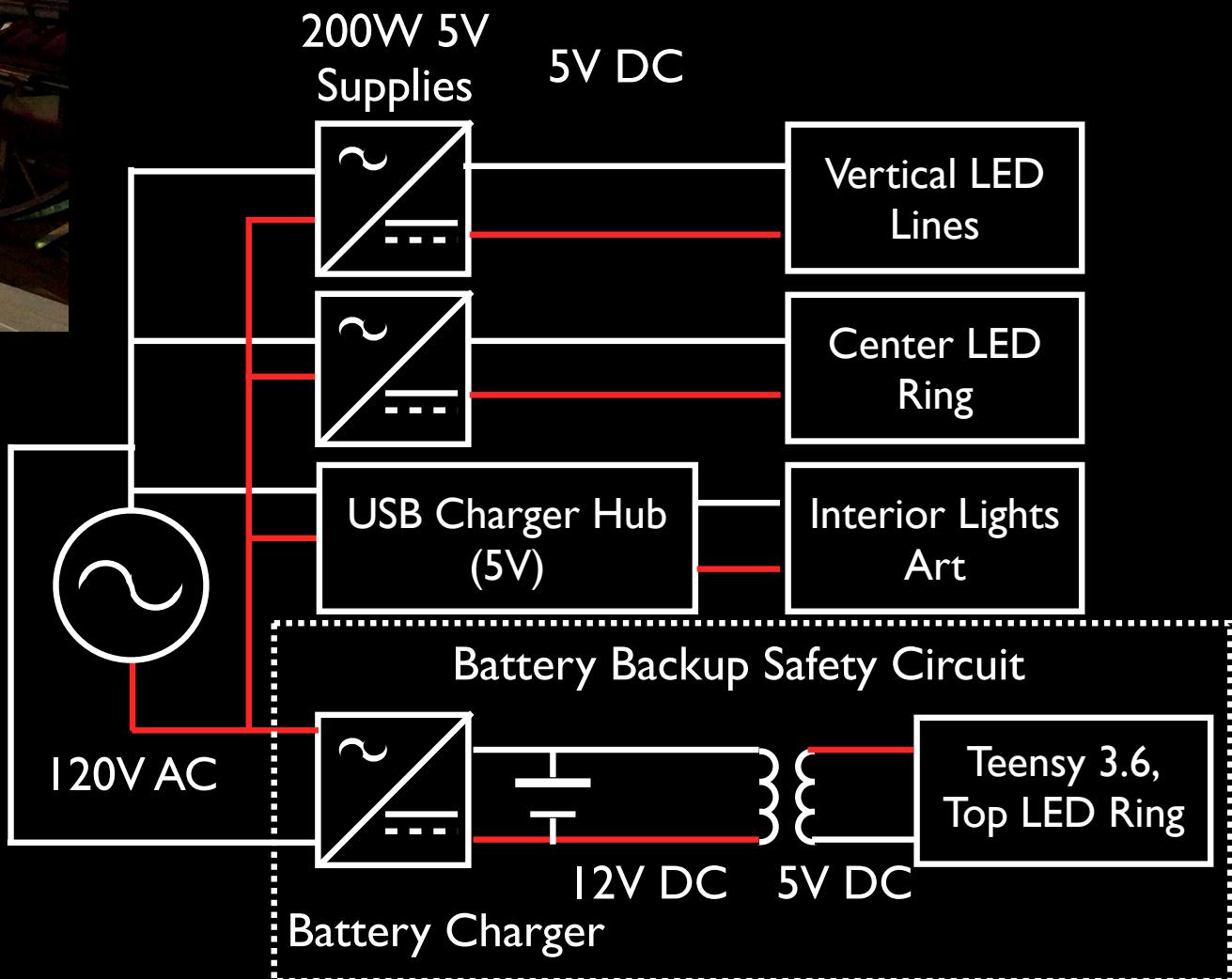


MDF, paint, metal powder, resin,

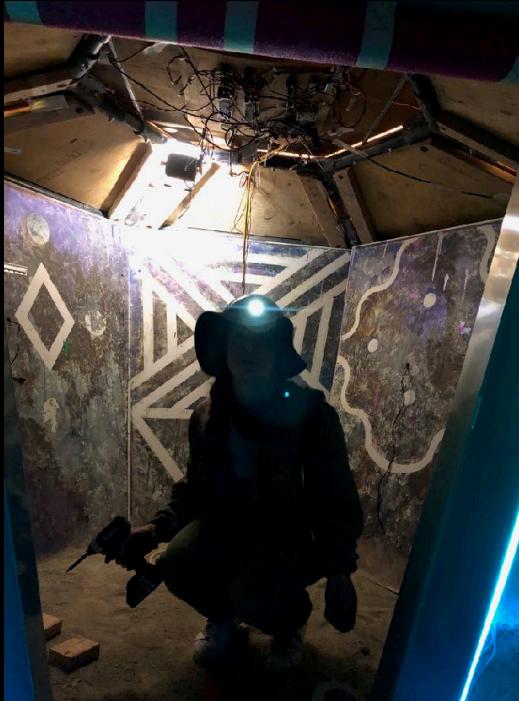
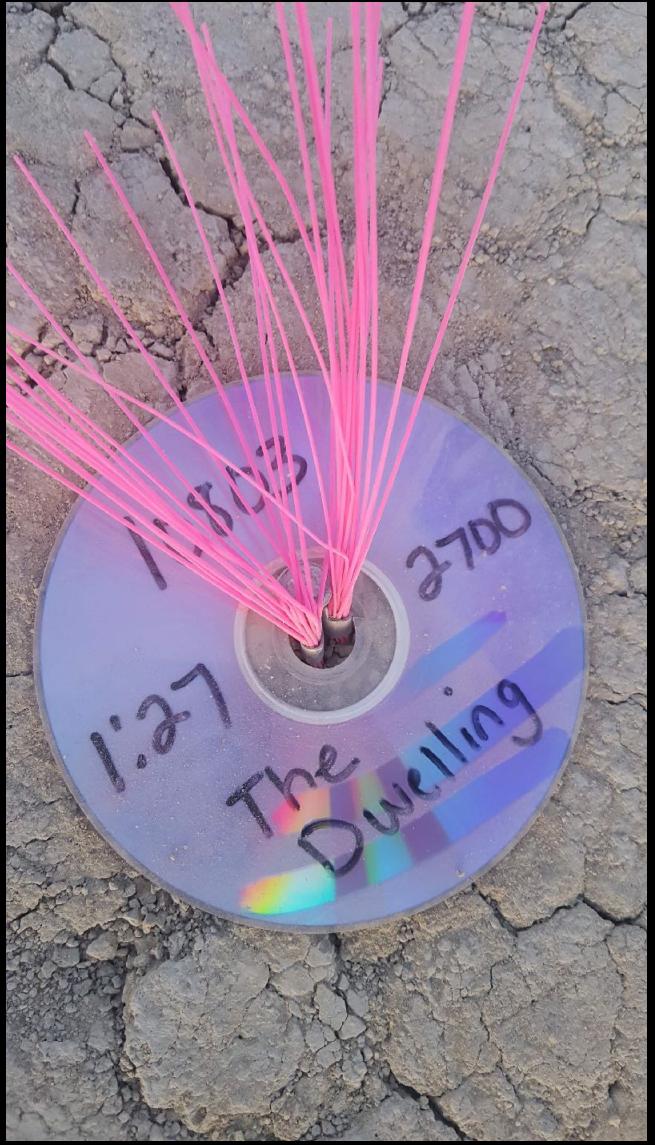
Lights and Power



LED strips direct from AliExpress (WS2813)
Teensy 3.6
8 parallel UARTs w/DMA

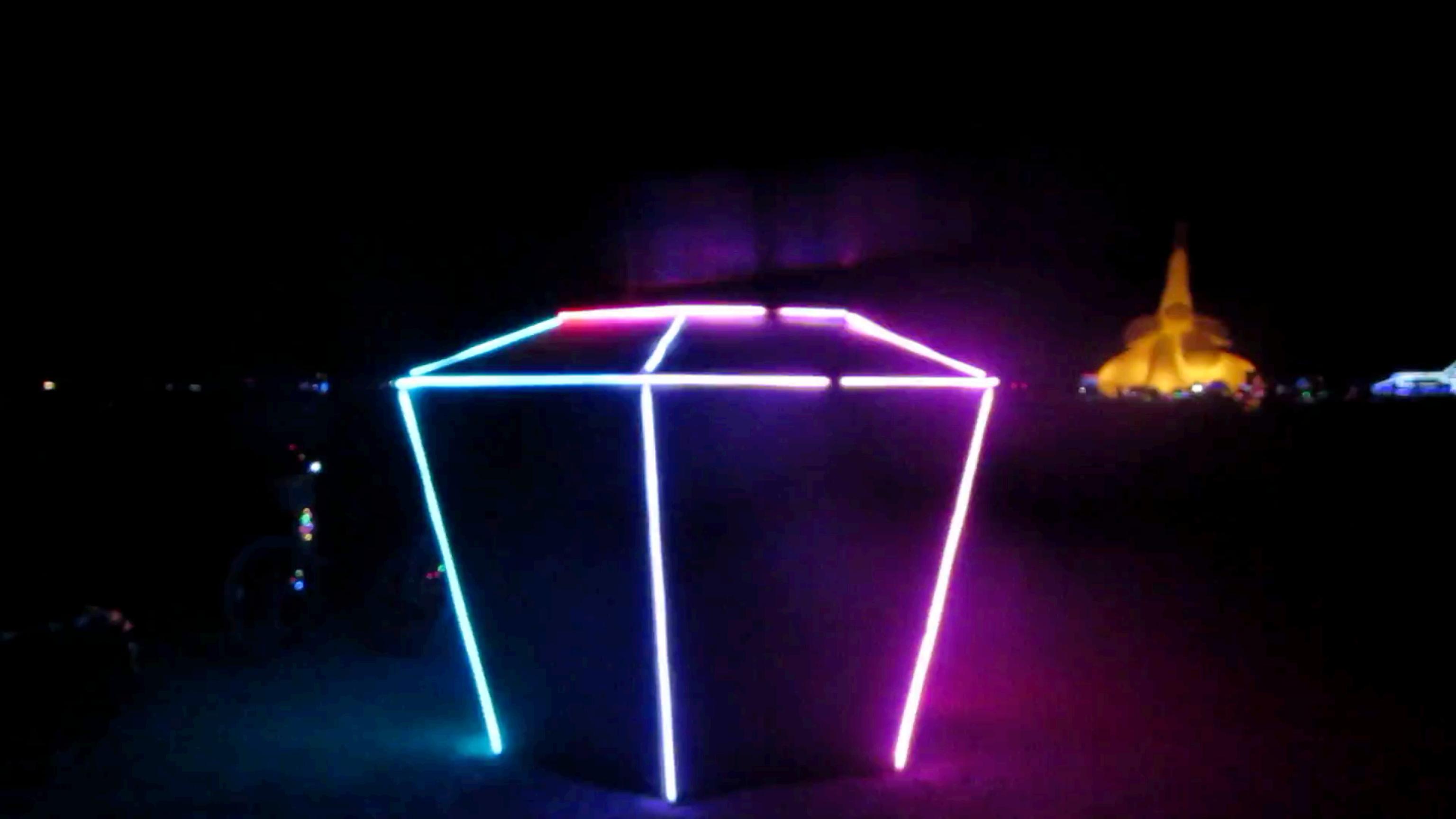


Transport and Setup









Art



Thanks

- Special thanks to everyone who supported the project and helped: Steve Clark, Mark Horowitz, Chris Ré, Dorsa Sadigh, Michael Bernstein, Behram Mistree, Ewen Cheslack-Postava, Jung-Il Choi, and Omid Mashayekhi