



SEPH REED

(no portfolio events filtered)

Unless otherwise stated: please assume that any code, iconography, illustrations, modeling, or design shown below was created personally and from scratch.

Controller scripting framework for live music improvisation via Bitwig



Started in 2016 and only just recently used for live improvised performance, elmprov is a secret passion of mine. It's a framework specifically for Bitwig's Controller Scripting API that extends Bitwig functionality to make it *a dream for live performance*.

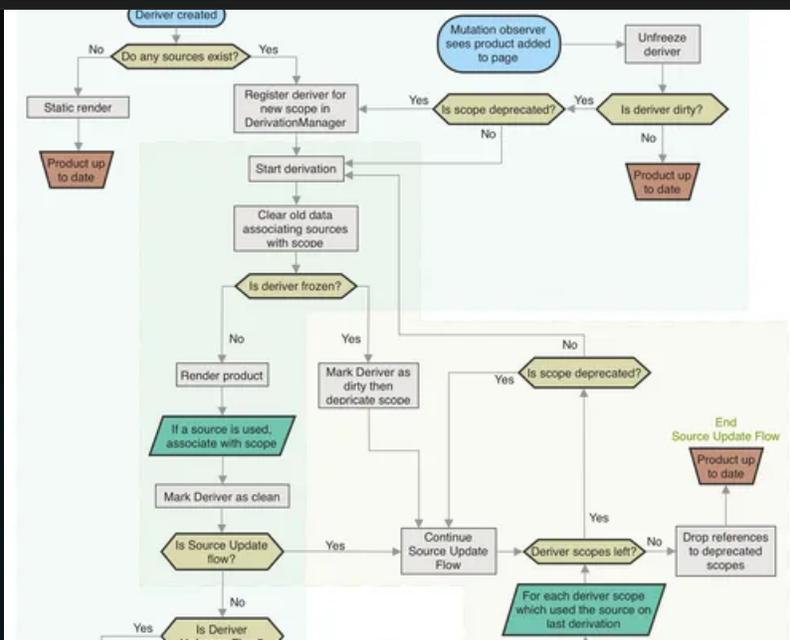
In a nutshell, it simplifies controller mapping and yields new functionality around *starting/stopping recordings, queue stacking them, controlling parameters on selected tracks*, and whatever else I need.

By far, *the hardest part of this project was the interaction design*. It's taken a lot of time and practice to figure out what really feels right in the groove.

Skills Used: Performance UX TypeScript Audio APIs Bitwig

The tool used to make this portfolio. Similar to React or Vue, but faster, lighter, and more versatile. Still in private alpha.

A STATE-RENDERING FRAMEWORK



Jeeze.. where to even begin? This project started with **"El-Tool"** in mid 2018. It was just a small ~200 line tool for taking a bunch of repetitive `document.createElement()` code and making it easier to read. In the end, *I liked El-Tool more than React for most use cases*, even if it didn't have states.

The next phase involved "observables," little state-like variables which had callbacks for whenever they were updated. I used these extensively in a Native-Script project, building a native mobile app. But observables got very tiresome at scale; they didn't chain

well and often created callback hells. I needed something better, and was blessed with a Eureka moment.

Helium is was arose from that. It was a pretty tiny project at first, and still is quite small (<400kb unminified with maps and definition files). But it's also definitely grown. At this point *it's the only tool I use for web development*, and it's magnificent! Having a couple of the right ideas together (I call it Source-Derivation) makes it so it's not only *more malleable* than any framework I'd used before, it's also *smaller* and *more powerful*... or at least that's what the benchmarks show.

Note: that compared to serving HTML, it is a bit slower: browsers multi-thread html like crazy, but multi-threading JS isn't so easy. This drawback effects all JS based tools.

Sometime around 2020 I broke the project into two halves: **helium-sdx** and **helium-ui**. The UI part extends sdx (Source Derivation) by adding a bunch of web specific stuff. And as of 2022 it's pretty much ready for release. *I've been using it in production for years on every project I do and rarely find things I want to add to it anymore*. But I don't feel like dedicating my life to it, and competing with Facebook seems like a nightmare so who knows if or when it might be released.

There's also a very useful sub-project for this I've been working on for a while called **helium-source-repo**. It's a tool that automatically manages pulling data objects from APIs, creating class versions of those objects, and serving them in a state-based source-derivation manner. It's hard to explain without showing, but it makes it really easy to get ahold of data, know if you should show a loading bar, edit the data, and push it back -- all without ever having to interact with any API directly or write a single callback.

Skills Used:

Low-Level Web

TypeScript

UX

Documentation

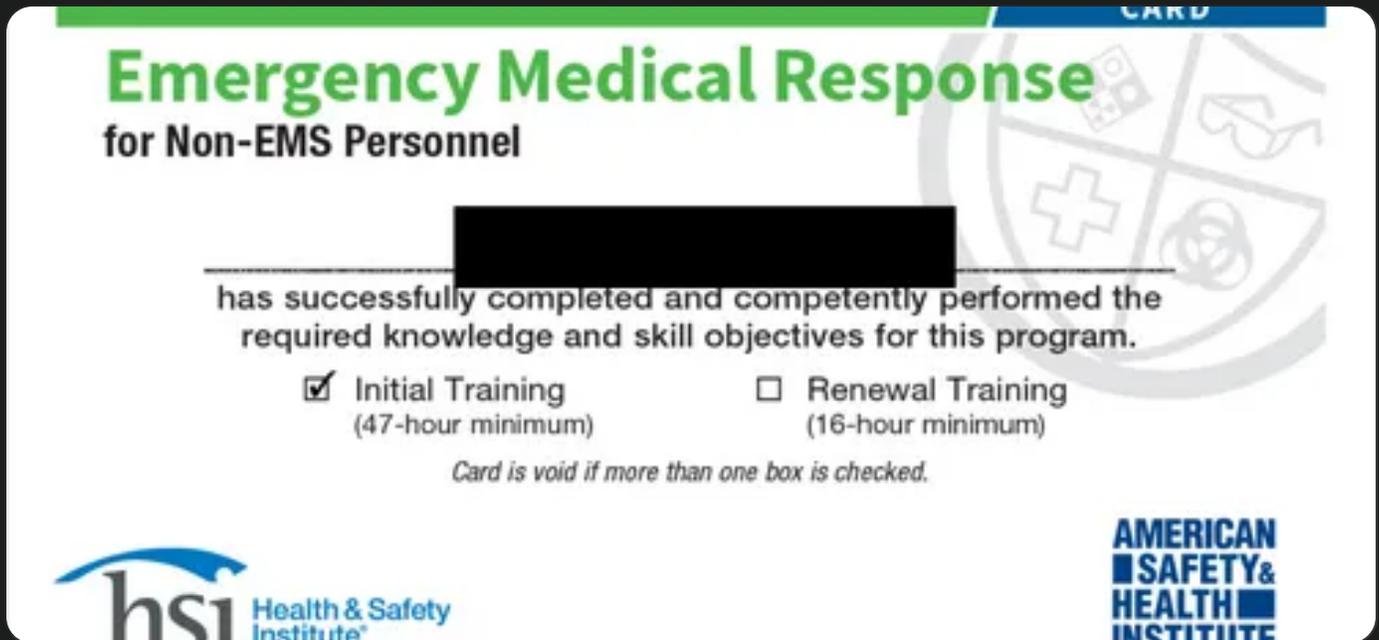
Helium UI

Sketch App

Website

Emergency Medical Responder Training

Keeping trauma patients alive long enough for paramedics to arrive; blood, breath, breaks and (heart) beats.



In order *to become a better volunteer firefighter*, I took a three week class covering basic Emergency Medical Response. Things we covered included:

- Cardiopulmonary Resuscitation (CPR)
- Ventilation and Opening Airways
- Oxygen Administration
- Patient Assessment and Interviewing
- Getting Vitals (Blood Pressure, Pulse / Ox, Etc)
- Wound Packing
- Tourniquets
- Patient Lifting and Moving Techniques
- Spinal Injury Stabilization
- Pregnancy and Child Birth

It was an awesome overall class which gave *a relatively in-depth and practical understanding of the human body*.

Skills Used:

CTO at Dot Earth Networks

Sole developer at social change start-up aiming to create collaboration between NGOs.



Heads up: due to funding issues, the project was not completed and there isn't much to show for the work.

The start of *this job was extremely serendipitous*. Boulder Dot Earth had been around for a long time, but had been lying dormant for the last few years. So Micha (CTO) got in contact with the originators to see if he could pick it up again, this time with newer tech.

In it's old form, it was a Wordpress site with event calendars for local non-profits, a directory of them, and some info on the generalized goals of the city. But *Micha wanted something a bit more tech heavy*, something with maps and a Single Page App (SPA) design. As it turned out, *I was working on a personal project with these exact properties when we met*.

My knowledge of the non-profit space was very limited, having come largely from a warless volunteer back-ground (art and firefighting). *Micha educated me on how dire the non-profit situation is*. Through his understanding of the space, and my ability to abstract and solve problems we came up with a solution.

The gist of **Dot Earth Networks** was to create *a mobile/web app that connected various loose ends together, creating a greater force for good*. The core goal was to get non-profits to *collaborate*, instead of being at war. But we also wanted to weave in *local voices, philanthropists, businesses, and government*. The exact details of how to build this

symbiotic network are a bit of a secret (as centralized political power strategies should be). But it was a good idea.

Micha secured a grant from the City of Boulder, and a collaboration with a local college to create the "Dot Earth Hive" where us and a small group of volunteers attempted to build something of *a social-good tech-startup*.

Unfortunately, while the network and tech skills were there, the money was not. I had to put in a three-month notice, which led to about four months of support trying to push it forwards. But as the only tech/business savvy participant, I was simultaneously the only person working on the actual product and heavily out-voted in regards to priorities. The appeal of the work drained tremendously.

In the end, I still love the idea and came out of the experience *enriched with a new understanding of the non-profit world*.

Skills Used:

MapBox

Helium UI

TypeScript

Node JS

Servers

APIs

Stakeholder Mgmt.

Web App

Peer Leadership

Wildland Fire Fighting Cert (FF2)

A packed 40hr weekend course on wildfire mitigation and control.



When you feel like being *able to run towards the fire*, you've got to get red carded. In particular, Fire Fighter 2 for wildfires.

Allenspark Fire Protection District (AFPD) sponsored my enrollment at **Colorado Fire Camp**, an 12-hours-a-day four-day class in South-Central Colorado. It was *the first time I'd ever gone to camp!*

While there we covered everything required to be ready for a wildland fire, which included *the effects and relationships of fire, land, weather, and fuels*. There was a

surprising amount of weather education, with **"fire-weather"** being considered a single item and the central focus.

We also learned safety and fire-fighting techniques and *practiced with a live grass-fire operation*, some line-digging, bunker-deployment, hose-running, and "mop-up." Bunker-deployment in particular was impactful: holding yourself inside a large air-less bag after a full sprint is an experience of self suffocation. I never want to get caught in a burn-over... (shudder)

If you've ever wondered about wildland fire, I highly recommend this school! It was a great education, and quite fun.

Skills Used:

Volunteer

Civil Servant

Traffic Jam Nascar (48hr Game Jam)

The theme of the "GMTK 2021 Game Jam" was "stuck together." Two friends and I made a game about aggressive break checking in traffic.



Created from total scratch (no framework) in less than 48 hours, the gist is: *accelerate and brake in a circle trying to cause collisions behind you*. There's a link below, if you want to see it in action.

The coding of the controls and visuals were pretty easy, with most of the difficulty coming from getting the acceleration and braking curves just right. *The hard part was the AI*. They do pretty decently, but balancing aggressiveness and risk tolerance made for a

fun and interesting challenge. I even got to watch someone do a play-through and enjoy it!

More Info

► Play the game

<https://sephreed.itch.io/traffic-jam-nascar>

Skills Used:

Games

Vanilla JS

HTML5 Canvas

UX

Sketch App

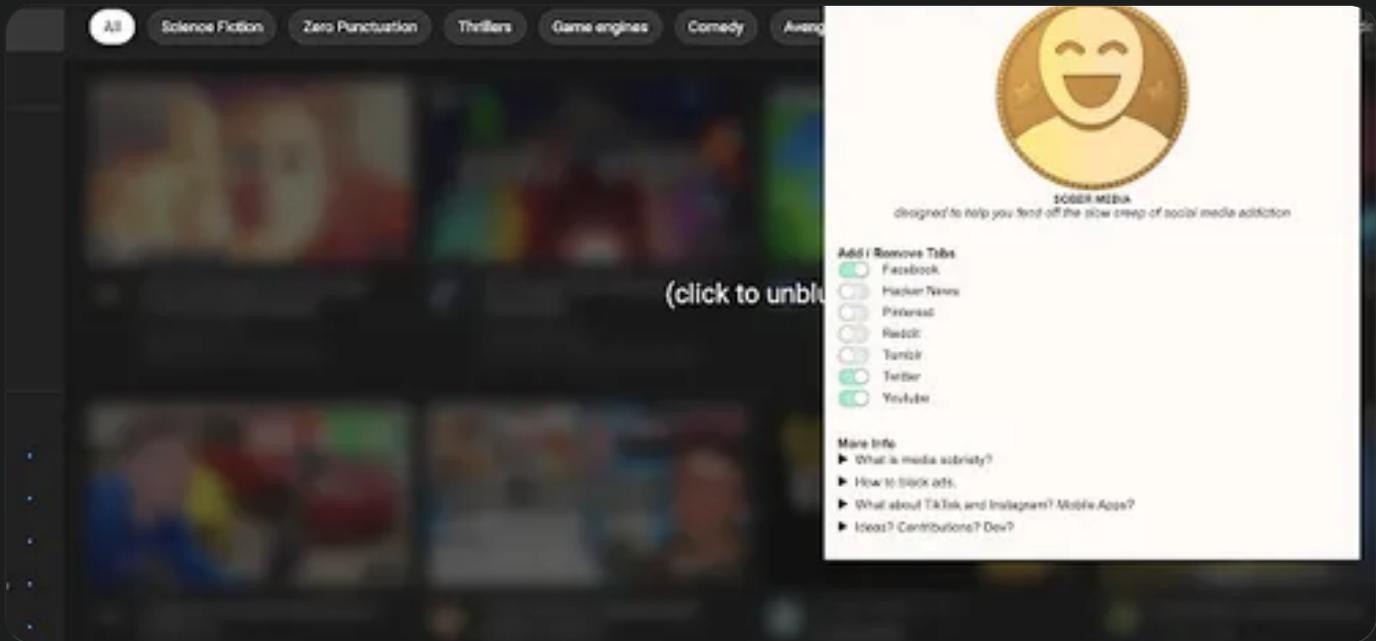
Collaboration

TypeScript

Peer Leadership

Task Delegation

A chrome extension for selectively blurring coercive social media content.



Currently defunct.

This project was inspired by a philosophy around *AI driven personalized feeds: they're about as fair as playing a game of "identity chess" against the grand master*. Plausibly, future generations shall look back on our *laissez-faire* attitudes around these algorithms the same way we currently look at the lax public health and sanitation rules of the dark ages: *"Such an obvious vector for diseases, what did they expect!?"*

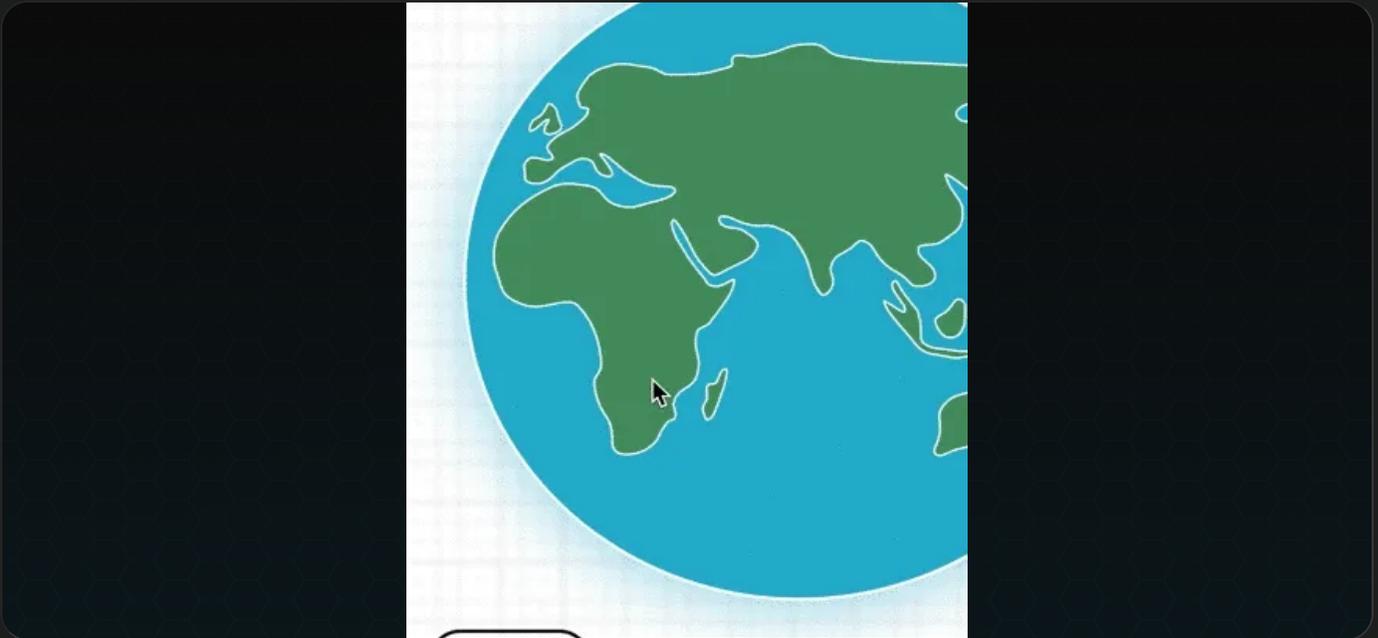
Anyways, the gist of this extension is that it *blurs out anything and everything related to user coercion*, and if you want to unblur something just click. Or -- if you don't want something blurred in the first place -- go to the settings and disable that feature. Pretty simple, but it adds *a layer of user consent where one had not previously been*.

As of today, it doesn't appear to be working anymore, which is fine. It never gained popularity, and keeping it up-to-date with the various ui-element selection logic of different social media sites is an endless endeavor.

The extensions `background.js` was built using `helium-sdx` as the state manager with live updates for every user interaction (no page refresh required). The extension popup's UI was built with `helium-ui`. The background script communicated with an

rCommunity

A web platform for creating micro-economies through friends and trust-networks. Similar to FB Marketplace, but focused on ad-hoc businesses and resource sharing.



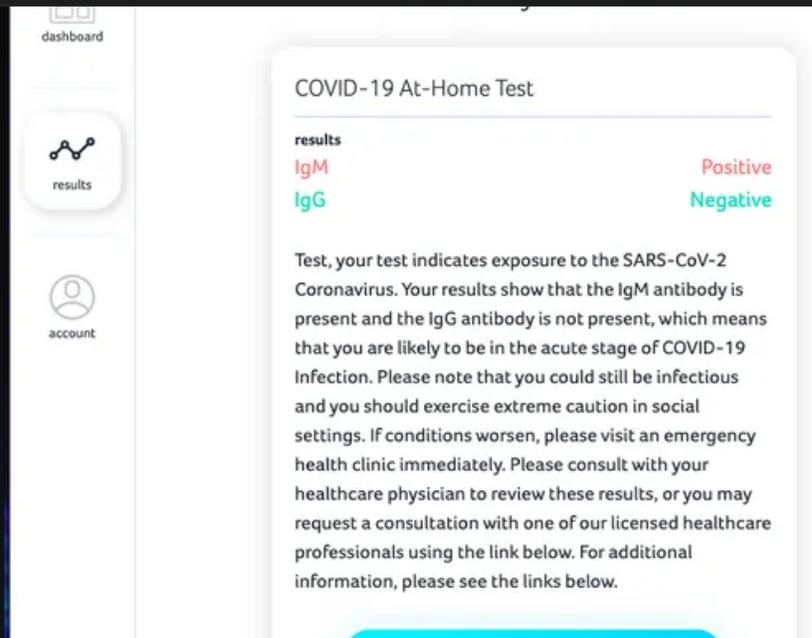
When [pixel wealth](#) came out, it felt like a call-to-action. So much of Misty and mine's income was going straight to Amazon; *what if we could buy, trade, and gift with locals instead?*

So I finally started working on rCommunity... again. *The first time I tried making this app was actually back in 2012, but I didn't have the chops back then. The premise was pretty simple, users create community trust networks and then advertise goods and services within them. There's no exchange of money through the app itself (we had alternate financial models in mind), and no legal requirements for users to post within their groups.*

The thing that really made this project special compared to normal online shops -- including Etsy or FB Marketplace Groups -- was the *actual community centered focus*. By putting community first, friends could *share resources and better circulate their micro-economies*. Also, I have a really dope categorization system which *uses a 20 questions approach to make perusing goods and services fun*.

The project was going really well, but I ended up getting distracted when a friend said he was starting a company and needed a CTO. I believed in the company mission, and

Sole developer for a subscription based at-home blood testing start-up aiming to monitor health and give personalized recommendations.



Your latest Total Cholesterol : HDL Ratio results were optimal.

Total Cholesterol : HDL Ratio

A marker of cardiovascular health.

Suboptimal

This was the first job I ever landed through LinkedIn. Choose Health was a health-sector tech start-up birthed by **Mark** (CEO), a guy who'd long been working in the field of supplements and marketing. The impetus was pretty straight-forward: *he wanted to prove the positive health benefits of supplements*. And what better way than by tracking and measuring health?

When I was first interviewed, Mark and Sam (PO) had already spoken with physicians and ran a pilot. They wanted to prove that *blood could be used to measure health*, and

that regular measurements could add value to users lives. The results were mixed, but they saw promise and *needed a full-stack, do-everything dev to make it happen*. In the end, I developed all of the following:

- A native *mobile-app for IOS and Android* which displayed blood results and recommendations
- Multiple refactors of a product site (given to me as plain HTML, eventually made an SPA, then migrated into *Webflow* for easier PO edits)
- The entire *back-end, including HIPAA security compliance*
- Untold integrations for *payments (Stripe), emails (product and transactional), analytics, shipping and tracking, user feed-back and communications, ratings...*
- *An entire separate micro-service* called "Diagnostic Infrastructure" which existed to connect doctors and in-need-of-release blood results. It was extremely asynchronous with extensive "user error" corrective measures. It had it's own front and back ends... it was a full project on its own.
- And, lastly, a *web-app* version of the mobile app

As I was approaching my 30th birthday, I took stock of my life and decided that -- while I was very happy with the quality of my work and freedom to pursue interesting solutions to problems -- I wanted to turn a new page. I put in my three month notice, *ended work on my 30th birthday then moved up into the Colorado Rocky Mountains*. I learned an absolute mountains worth while working there.

Skills Used: Mobile Apps Micro-services Integrations Event Systems Stripe TypeScript
NativeScript Node JS SQL Servers APIs Stakeholder Mgmt. Roadmapping Web App
Website

A website for exploring micro-tonal music theory, with built in keyboard synth.

Intervals						
☆	$3/2 * 6/5 \Rightarrow 9/5$			9/5	Di Pen	67
☆	$3/2 * 7/6 \Rightarrow 7/4$			7/4	Di Hex	76
☆	$3/2 * 8/7 \Rightarrow 12/7$			12/7	Di Sep	85
☆	$4/3 * 3/2 \Rightarrow 2/1$			2/1	Tri Di	20
☆	$4/3 * 5/4 \Rightarrow 5/3$			5/3	Tri Qua	56
☆	$4/3 * 7/4 * 9/7 \Rightarrow 3/1$			3/1	Tri Quatre Septu	69
☆	$4/3 * 6/5 \Rightarrow 8/5$			8/5	Tri Pen	61

This project started out as a way to *visualize a micro-tonal music theory*. In particular a theory that one of the mathematic aspects of good musicality is having complex relationships that resolve well; like a major triad where $4/3 * 5/4 = 3/2$.

The first iteration of this program was just something that brute forces different combinations of a list of simple ratios. In order to have some bearing of where they were on a piano, **HTMLCanvas** was used to draw their "western approximation". Then, *in order to hear them, a synth was added*.

It was good enough to share, so I eventually made a public website for it (linked below) and added some information on the general "just intoned" music theory.

Since starting this project, **Bitwig** has added micro-pitch features which allow for experimentation with these alternative scales. Unfortunately -- as I'm not the first to find out -- *most of what people find "pleasant" in music is rooted in familiarity*. But it's still fun!

More Info

- [JustTunings.info](http://just-tunings.info)
<http://just-tunings.info/learn>

Lone Bar Beer\$\$\$ 4U

A silly joke that was taken to a professional level of fabrication: a beer loan agency.



"Wouldn't it be funny if we made -- like -- a scummy loan agency for beer?"

Nobody knows how it started, but *it was a stupid idea which turned into a big, giant, hilarious, stupid project*. What a blast! And over time the project evolved into more than just a joke, but a truly rewarding experience for participants. People would come up, enjoying the inherently comedic aspect of the piece, we'd spend some time riffing with them, send them on a quest to "improve their beer credit," and then on return we'd give them a warm foamy tasteless lager.

My favorite quest came on the last day of the event, where -- having been given the information of various beer loan holders -- we began sending people out to "serve" them their "beer debts."

An intentionally ludicrous amount of time and energy was put into building out the visage of a beer loan agency, including:

- A "safety-windowed" desk for interactions
- A tacky waiting area with a tiny (toddler sized) couch
- Background "Muzak" from 80s Kmart's; pitched down slightly to give it a subtle comedic affect. Store ads were either modified or replaced to keep in line with the aesthetic and storyline.
- A television playing various serious looking satire pieces such as: onion 24 hour news, monster trucks, fake car commercials, etc.
- So many carbon-copy paper forms which had to be filled out (and faxed until the machine broke). Filing these with one of the "Loan Bar Employees" were the crux of user interaction; my two favorite "Beer Loan Requirements" were:
 - "Did you just lose the game?" -- a reference to a game that is lost by thinking of it, and
 - "Has nice eyes?" -- the answer was always yes, and it made people smile.
- A book of "quests" to so applicants could improve their "beer credit." My favorites were:
 - Go find pointy -- a scavenger hunt for our mascot Pointy Mc PointyFace
 - Go to "Lets be Frank" -- another art camp that had users share an embarrassing truth as chosen by a wheel spin (then get a hot dog)
- Employee dress codes and legit engraved name tags (they say "Beer Loan Professional" on them, and I love mine)
- A legitimate filing system which we used to verify quests that were completed
- A faux buy-out and merger with a local bar. An actual MIT lawyer got in the way by making a case that we still owed their camp a partnership deal.
- A very large ugly sign which said "This attraction sponsored by Loan Bar" that we bolted into the ground outside of various other art pieces (they had, unknowingly,

signed papers which said we could). To this day, the sign thrives and hastaken on a life of its own, getting bolted down all over the place in Austin.

- A wacky wavy inflatable arm tube man, bought specifically for the event.

Just writing about it is enough to get me laughing and smiling. It was just so completely out of place at an art festival, but -- for participants who'd been around a while -- the joke was "epic."

Skills Used:

Interactive Art

Performance

UX

Fabrication

Video

Audio

Bitwig

Collaboration

Clock Out (48hr Game Jam)

The theme of "GMTK 2020 Game Jam" was "Only One." This game let users "hack" multiple game-engine state variables a single time each to solve puzzles.



Made for the first ever GMTK Game Jam, this was also the first game I'd worked on since I was a child. The theme was "Only One," and *I really wanted to test out Helium UI's **source derivation** algorithm.* So -- using helium -- I coded a puzzle game entirely out of **HTMLElements**, where you "hacked" state variables to get to the goal.

This was a brash decision to have made, as *it yielded SO MANY BUGS.* But that was kind of the point: I made something *much more demanding than a website* and found the points of failure. At this point **helium-sdx** was just a baby, yet it was still possible to make a game with it -- a game that React simply wouldn't work for.

The game was submitted with no time to spare; it was uploaded as a compressed folder and nobody except my friends played it.

More Info

- ▶ Play the game
<http://sephreed.me/clock-out/>

Skills Used: Games Helium UI TypeScript Collaboration Sass Peer Leadership

Death Gun

A tesla coil shooting gallery; I programmed the game and score board aspects.



Aerica is an amazing muralist; Steve an electrical engineer with a fondness for tesla coils. They're a bit of a power couple, and came up with this amazing project. But they wanted to take it a bit further by making the game more gamey: they needed a programmer.

The first part of the project involved setting up a *Raspberry Pi* running *Node JS* and using one of the *USBs* as a *serial port*. It took some finagling as it was new territory and there's always a lot of gotchas when working with micro-controllers.

From there the coding was breezy, taking only a few days. The *scoreboard* was a *website with a websocket* open to a localhost server. The same server controls the game and responds to user input. In regards to game design there was some experimentation: the system ran on asynchronous promises rather than a constant loop. For testing the game, a small mock up web version of them game was created.

The experience of the game was three levels in a branching path where each one could lead to either a greater or lesser challenge; a total of 6 levels. *Almost every player was able to complete the game, but only a few made it to secret-ish the hardest level.*

One of my favorite "pranky" aspects of the game was that there were only 6 digits for high scores, and if a player went above that it just rolled over to zero. *Many laughs were had*, and it set a new challenge: get as close to 999999 as possible without going over. The other "pranky" part of the scoreboard was that it displayed "most average scores" as well as high-scores. Players were rewarded with plenty of fanfare for getting a "most average" play-through.

More Info

- ▶ [View Aerica Ravens Portfolio/Gallery](https://www.aerica-raven.com/special-projects/deathgun)
<https://www.aerica-raven.com/special-projects/deathgun>

Skills Used:

Interactive Art

UX

Node JS

Linux

Micro-controllers

Collaboration

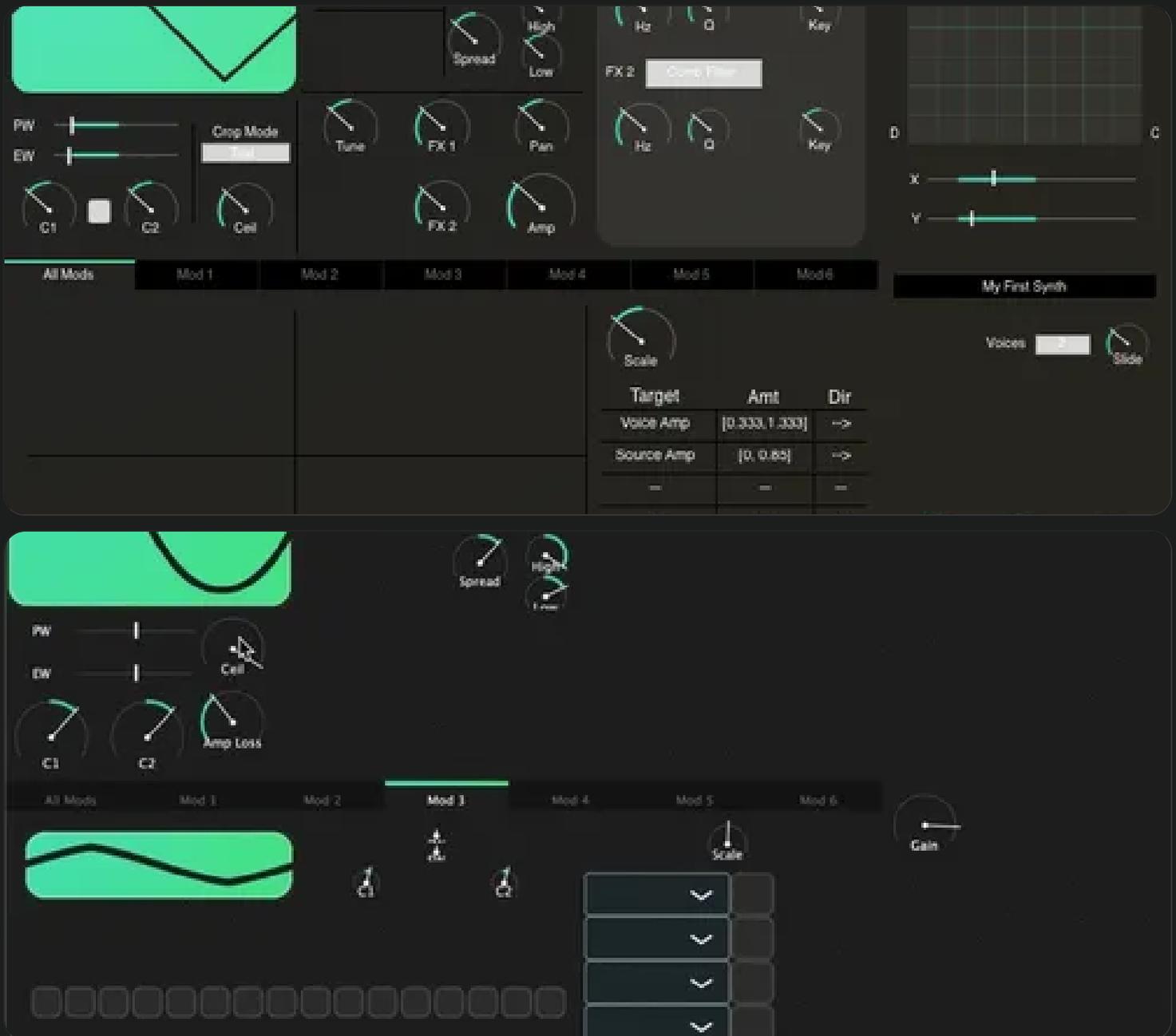
Games

HTML5 Canvas

TypeScript

Tradition Churner

A "Virtual Synth" VST which allowed me to finally hear a wave function I'd long dreamed of.



The idea for this synth first came to me around 2008. It was a decade later before I had the skills to make it.

The premise of this synth is that *it's possible to seamlessly shape a wave into the four standard forms* (sine, saw, square, triangle) using only two parameters. These parameters are the curviness and skew. You may be able to see what I mean in the animation above.

But just imagining the visual was not enough, it had to be heard. Alas, *this project was hard*. I leveraged the **JUCE** audio framework's solid tool-set as much as possible, but there was still tons of highly specific Digital Signal Processing (DSP) challenges. Notably,

creating the *perfect formulas for the curves* (linked below), and trying to implement an asynchronous multi-threaded "observables" system in C++ (*generics and mutexs* oh my!) were big wins. But the truly hard part was the routing system!

Any signal could be used to modulate any parameter on a per voice, per wave, or synth-wide basis. This introduced *a ton of performance complexity around how to minimize buffer usage*. Treating every signal to the "per-voice" solution would have wasted tons of resources. I mostly remember feeling more exhausted than I have with any other project.

This synth was never fully completed (art, right?), but it did get far enough to sound awesome! Since then **BitWig** has come out with their own modular synth system which is enough to generally recreate TraditionChurner. Though not as performant (sans caching), it's pretty cool to be living in the future.

More Info

- Formula for tweening a sine curve to a square or line
<https://www.desmos.com/calculator/ac2i4rpsb4>
- Output formula for curve knob
<https://www.desmos.com/calculator/zmhrbxvlju>

Skills Used: C++ Audio Sketch App APIs Event Systems Signal Processing Synths

A tongue-in-cheek resource-management board game based on start-up culture.



reading this] "Hey boss. Sorry I won't be able to make it into work today, I've got that thing that's going around the office." Choose an employee to take 1 task from. Also take 1 task from any employees *directly adjacent* to them.

Regards,
Office

stand and not show it off. If you have any employees with the **IMPULSIVE** quality, they each get a blame token and you get -1SYN. Otherwise, the keg stand is dope +1SYN.

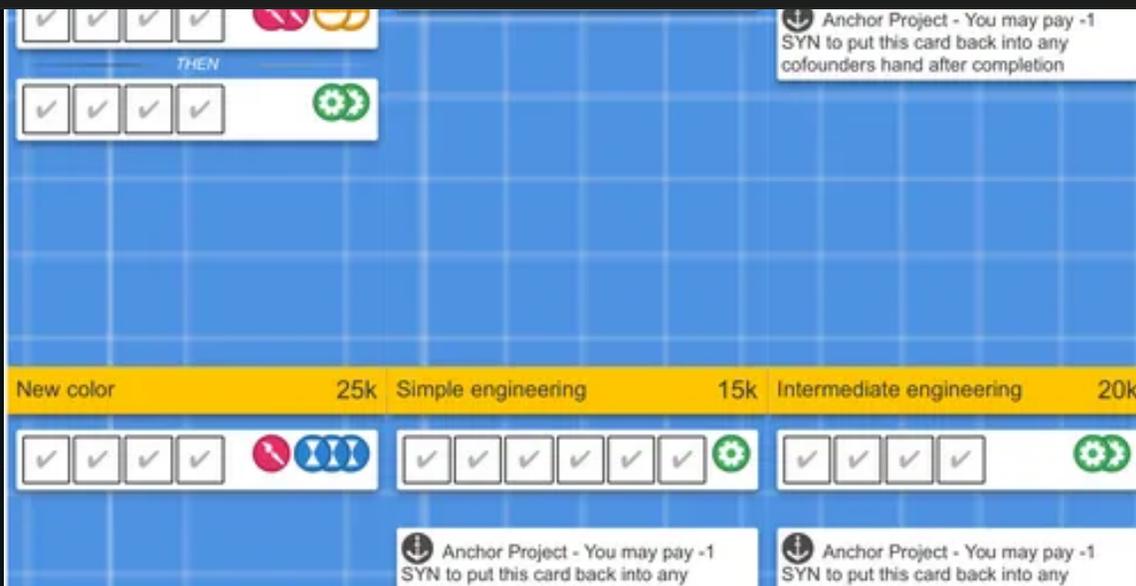
Regards,
Office

A Donuts!!
from: Announcements

☆ **O** Where the pens at?
from: Office ☆

Someone brings donuts to the office. If you have more than one employee with **IMPULSIVE**, they eat all the donuts and each get a blame token. Otherwise, +1SYN.

A signature is needed and no pens can be found. Who's job is this? If you have HR, the issue is caught in time. Otherwise, it goes on far too long for -1SYN.





Inspired by a copious amount of love for board gaming -- then mixed with the woes of job hunting and start-up culture -- Synergy was a fun and comedic respite for Misty and I. The process *started off with watching "Office Space" on loop*, trying to catch that humorous immortalization of tech life. But as time went on, the game became something more.

The basic gameplay has gone through various stages, with more to come. But the gist is: every player is a co-founder, you hire employees, upon hiring you pull quirk cards, events make the quirks come alive, you've got long term goals and short term tasks, and *Synergy represents that ever fleeting resource: employee happiness*. We'll see how much of this changes in the next iterations.

The characters were made in Sketch App, as well as the iconography and illustrations. But *the crux of this project was definitely rendering the cards*. Every single part of every type of card was defined in the form of a spreadsheet. These spreadsheets were then parsed and rendered in-browser to look like something out of Adobe Illustrator. And from there it's printable. This was a great design process as *having everything be generative from spreadsheets allowed for super fast iterations*.

We did a little bit of "blind" (no input) play-testing with our friends, cut short by me getting a new full time job. There were definitely some flaws; most notably "hierarchies"

kept emerging amongst players that led to one of them being the boss over the others. The other problems revealed were also pretty similar to real jobs. lol.

Can't wait to start this one up again later!

Skills Used:

Games

2d Art

Sketch App

Sass

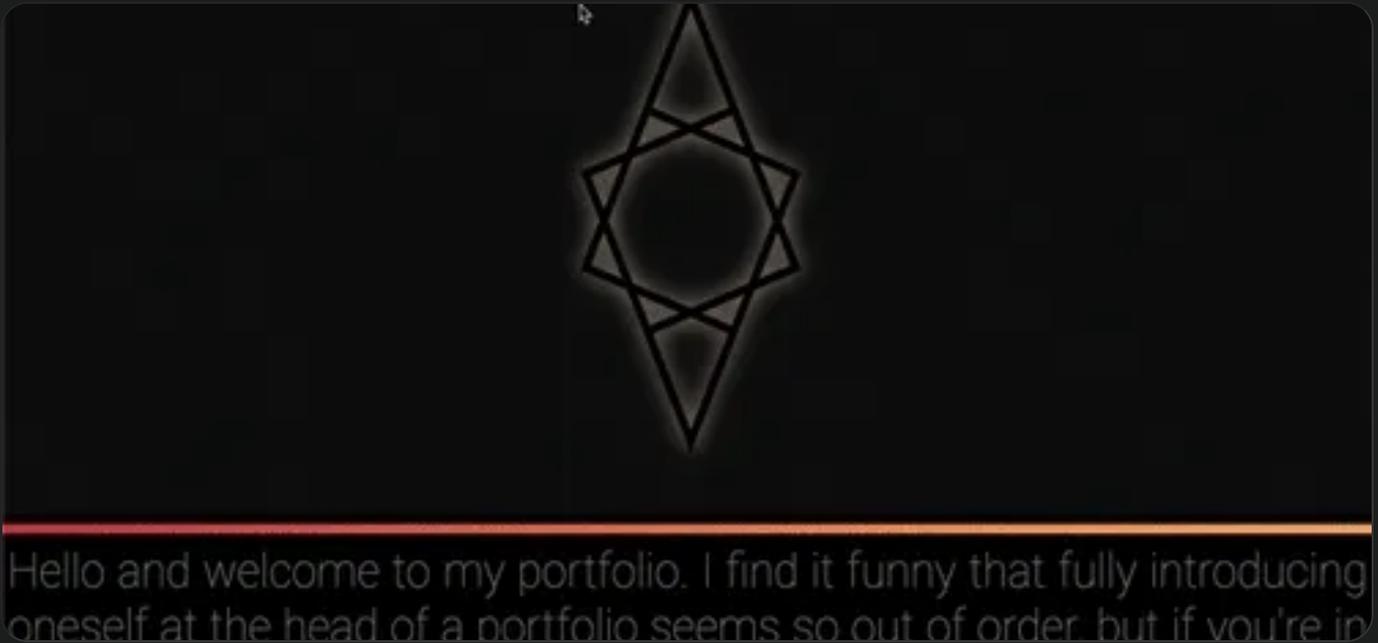
TypeScript

Collaboration

RegEx

2018 Portfolio

Previous portfolio, utilizing an early prototype of my web framework "Helium-UI"



The styling for my second portfolio was *based on a design session at Coder Inc where two others and myself were asked to redo the entire sites aesthetic*. We wanted high contrast, dark theme, with slender lines and hard edges. And indeed, it does come off pretty professional.

But there a few others things being experimented with here.

- Firstly: 'el-tool' (a precursor to Helium UI) was getting it's first real run,
- secondly: a grid-locked scaling system was created for UI elements, and
- thirdly: chamfered borders (not a 90 degree angle or a curve).

If you check out the old site, you'll see that there's a grid in the background which sort of glows wherever the cursor goes. And you'll also see that *all of the text and borders are aligned to the grid*. Pretty neat!

The chamfered borders were a major hassle, having to be first drawn by an **HTMLCanvas**, then exported to an image, then set to the border image of the element. Surprisingly, the hardware load was negligible for this.

I never intended to make a new portfolio, in fact this one started as merely an update...

Front-End Developer at Coder Technologies

At a tech start-up, assigned to develop a browser-embedded IDE and a CRUD site; ended up filling a bunch of other roles.



When I started at Coder there were less than a dozen employees, so I got to fill many roles besides front-end developer. Our mission was to create a collaborative cloud based software development suite, including in browser IDE and remote compilation/storage/hosting. Some of the projects I did include:

- Site wide theming, procedurally generated from Textmate/Bash themes (see Lumas)
- Many internal pages of outstanding quality (as said by the designers and QA)

- Major site components such as Button, Link, EditableText, ValidatorInput, PageTween, MinimizableDiv, and Modal
- A keyboard navigation system for the IDE
- Background/intro/outro music for company promo/tutorial vids
- Original concepting for landing page
- Some major influences in our workflow and timeline
- Head of Easter Eggs
- A few very nice blog posts

More Info

- Coder.com *
<http://coder.com>
- Watch product video I made the music for
<https://www.youtube.com/watch?v=CMKRbc8DpVs>
- Link to song from video above
<https://soundcloud.com/thumbz/forestbackground>

Skills Used:

TypeScript

Sass

React

Node JS

Vanilla JS

Audio

Bitwig

Documentation

Web App

Lumas

A consistently readable UI palette generator, meant to turn IDE themes into full site themes.



Lumas was a custom theming tool designed (while at Coder) to be able to *take arbitrary color palettes and turn them into readable, consistent UIs*. It does this by mixing and matching color gradients and luminosity mappings. The video below does a great job of showing these steps it takes when creating a theme:

1. First, organize the random colors of a set by luminosity (a function of human perception that takes some work to get right).
2. Then, make a gradient from black (0% luminosity) through the colors (in order of luminosity) to white (100% luminosity).
3. Finally, use luminosity mapped css variables such as foreground, background, faded text, and border color to specific luminosity positions within the gradient.

By keeping luminosity constant, contrast remains stable (regardless of changes to overall hue or saturation), and contrast is the most important part of any UI. Calculating and setting luminosity is much more difficult than Value in HSV or Lightness in HSL color spaces.

More Info

- [Screencap of Lumas demo](https://www.youtube.com/watch?v=47XCOWGpAQU)
<https://www.youtube.com/watch?v=47XCOWGpAQU>

Syntactic sugar for creating HTMLElements, turned out to be extremely performant.

```
    innards: [
      anchor("TopbarLink", { href: "here.com" }, "Here"),
      anchor("TopbarLink", { href: "there.com" }, "There"),
      anchor("TopbarLink", { href: "elsewhere.com" }, "Elsewhere"),
    ]
  }),
  div("MainContent", [
    div("Route", {
      ref: (ref) => routeState.observe((route) => {
        let content: HTMLElement;
        switch (route) {
          case "main": content = div("Main"); break;
          case "about": content = div("About"); break;
        }
        setInnards(ref, content);
      })
    })
  ]),
  span("ToTop", {
```

El-tool is the project which eventually flourished into **helium-ui**. I started developing for Coder IDE code-base. It *was basically just syntactic sugar to reduce the boilerplate for creating HTMLElements...* but then (on my birthday) I decided to do some benchmarks. I compared and contrasted various ways (React, Vue, native) of generating a few thousand divs with random numbers as text and found that the only way to render a DOM faster was with raw (and non-interactive) HTML. Basically, *I'd stumbled upon what was -- perhaps -- the fastest possible way to render an interactive DOM*. Hard to believe, but here's the two key factors:

1. It's faster to use **document.createElement("div")** to create an element than it is to use html strings (React)
 - this is true whether you create elements one at a time, or create an HTML string for thousands of divs
2. Any loop or function that gets called a lot (in V8 engine) will become "hot"
 - "hot" code is optimized for its common use, with look-ahead
 - also, as a side effect of "temporal locality" (used by RAM/CPU recently), "hot" code has reduced fetch time

Pretty neat! But, much *like default React, El-Tool did not have any useful state management system*. Because of that, I wouldn't consider it a true competitor to any

PINE Cononagon

Co-designer, Lead Engineer, and Foreman for a large-scale community-built multi-media interactive art piece about life and death. Delivered early and under-budget, without any volunteer burn-out.





This project was the most involved I've ever led. It was *a large-scale multimedia endeavor, spanning three floors, brimming with creativity*, and built entirely by volunteers (myself included) on a shoe-string materials-only budget.

The outside of the piece was meant to look like a pine cone and had a nine-sided (nonagon) footprint. Interior, *there were three floors and a secret room*. The second floor was the main entrance; a twinkling forest with an 8ft wide CNC-etched-bark tree in the center and hand-made vines woven around. An arched cove in the tree led to a spiral staircase which wound down from the mortal realm forest into the after-life underworld; a cozy den filled with community art pieces dedicated to lost loved ones.

The *underworld represented the idea of immortality through lore and stories*; it also housed a live acting group which sent participants on quests related to helping citizens of the afterlife. The *top-most floor was hidden as it represented immortality through science* and was decorated as a comfy padded stratosphere staring upwards into fiber-optic constellations spread across the ceiling.

Once *lit on fire, the petals which covered the pine cone opened up* using springs and burnable restrains, a homage to how pine cones reproduce. The last reveal was hidden in the middle of it all, a metal tree which remained standing after everything else had burned down.

Here are the parts I can claim responsibility for:

- Leadership
 - Always having next steps planned and diagramed
 - Showing people easier ways to do things (being *mindful not to ruin the puzzle* if they were still self-teaching)
 - Exemplifying safety and always doing things in ways others could understand
 - Being *thankful and appreciative* of others
 - Keeping an eye out for the safety of others
 - Making sure to not let people overwork themselves
- Foreman and Engineer
 - Create, maintain, and reference 3d CAD model
 - Assurance and testing of sturdiness/strength
 - Planning out and *testing build tasks (materials, tools, techniques) before assigning them*
 - Helping with build tasks when I had the time
 - Knowing everything currently being worked on, checking in frequently (and congratulating often)
 - Coming early/staying late to do all the worst work that would be cruel to assign
- Co-Designer
 - Came up with thematic inspirations for each of the areas, and wove a story across them
 - Decided upon artistic boundaries for the art pieces, soundscape, and live actors
 - Came up with lore and backstories for the piece
 - Created the overall canvas which the volunteers filled
- Developer
 - Wrote the software for the LEDs
 - Made the proposal website

We managed to complete this project in record time (the event has been running for 20 years) while training newbies, keeping well within budget, without any drama. I'd long since felt capable of leadership roles, but this level of success indicates something beyond being simply "capable". That said, I could not have done this without Misty who is an amazing Product/Project Manager, HR, UX Designer, and Creative Director. Nor could either of us have done it without all the build crews, volunteers, and organizers who came before us and paved the way.

More Info

► Project Proposal Website

<https://mistynickle.github.io/DaFT-2018/proposal.html>

Skills Used:

Peer Leadership

Structural Eng.

Architecture

Fabrication

3d Modeling

Interactive Art

UX

Collaboration

Roadmapping

Task Delegation

Volunteer

Onboarding

Mentorship

Website

SketchUp

My first portfolio, using my first custom (Vue-like) web framework "PINE" and some 3d animations.



Even though I'd been programming since age 10, and majored in it in college, at age 24 I'd still never worked a tech job. No regrets there, I was adventuring and being young! But *in 2014 I decided to maybe try out a bigger paycheck, and this was my first portfolio.*

It was built on my first web framework (called PINE), and had quite a bit of interactive qualities. In 2018 I made a new portfolio that was "more professional", but now (in 2022) I'm returning to my roots. This portfolio before you is very much inspired by my very first one.

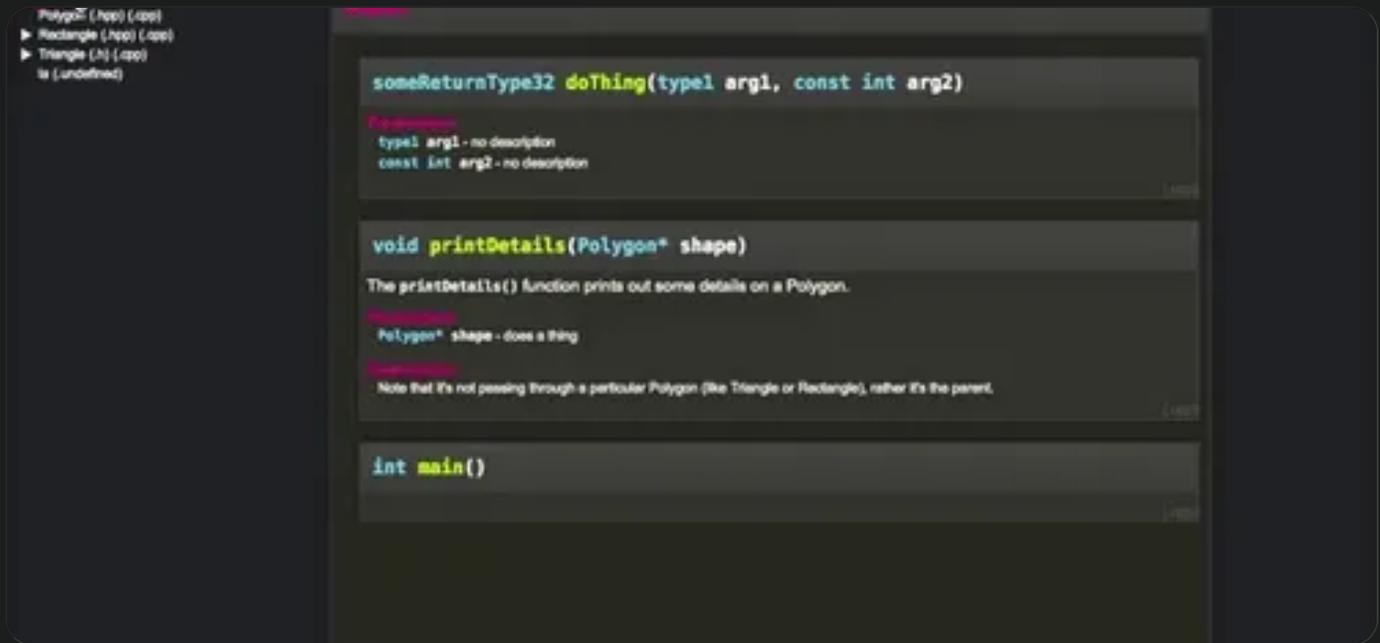
More Info

- Check out my [github.io](http://sephreed.github.io/portfolio/index.html) portfolio
<http://sephreed.github.io/portfolio/index.html>

Skills Used: Vanilla JS Three JS HTML5 Canvas Website

Docurizer

A documentation generator built to dissect an open-source C++ project that had no docs.



In order *to make sense out of an undocumented open source C++ project*, I built these two tools to parse the project and *automatically generate docs based off any comments it could find laying around*. A year later, I discovered that when I created Scopifier I'd inadvertently reinvented grammars. As for Docurizer, it takes a symbolic tree generated by applying a grammar, reorganizes the information, then renders it as html.

More Info

- View Docurizers rendered output (try inspecting elements)
http://sephreed.github.io/portfolio/Docurizer_Render/index.html?file=main.cpp.html&ov=inc
- View C++ grammar for Scopifier
<https://github.com/SephReed/Servers/blob/5e7984405e47587f234679b8bc0e114824e7da13/Docurizer/li>
- View project source code
<https://github.com/SephReed/Servers/tree/master/Docurizer>

Skills Used: Node JS Syntax Parsing C++ RegEx Documentation

My first attempted browser-based 2d game maker, inspired by the application I first learned to program in: RPG Maker 2000.



There's a soft spot in my heart for 2d games, and *RPG-Maker 2000* was what got me into programming when I was ten. A decade and a half later, I decided to look back into it and -- to my dismay -- it wasn't what it used to be at all anymore. Plus it was only for windows.

The goal of this project was to recreate that childhood tool, in browser, and make it free for the world. I ended up setting this project aside as I simultaneously started my full time job at Coder, and began planning for the PINE Cononagon.

More Info

- ▶ Play with live demo (no server access)
<http://sephreed.github.io/FlatStory/index.html>
- ▶ View source code
<https://github.com/SephReed/SephReed.github.io/tree/master/FlatStory>

Skills Used: Web App Node JS Servers HTML5 Canvas

"Zen Style" Porches

Some front and back porches, inspired by the architecture of Japanese Gardens.



A friend of a friend -- Brad -- was looking for some artistic builder types to make his home a little more interesting. In particular, his front and back porch. At the same time, I was between jobs, so we got together to design and build this little project. *Inspired by Japanese garden architecture, the support beams are hidden from view and the angles are rarely orthogonal.* It was a new style for me, but it came out great! He still makes sure to bring up how much he likes it every time we run into each-other.

Skills Used:

Fabrication

3d Modeling

SketchUp

Architecture

Structural Eng.

UX

Subcontractor in Home Renovation

Jan - Aug 2017

Home renovation projects, working for Daniel Jost



This was just your basic construction job. We messed with wood, drywall, structural stuff, plumbing, and wires. *The only curve-ball was that we were working on peoples homes while they were there, so we had to be extra clean, mindful of noise, and have attention to detail.*

Skills Used: Fabrication

Independent Contractor for Project "Dad Light"

A custom built audio-reactive ceiling light fixture, with an app for control.



Sally Hall was just finishing up her classes at Austin Center for Design and had a wonderful idea of a gift to make her father. The basic premise was this: *Her father was an audiologist, so she wanted to make him a ceiling light which responded to sound similar to the way the hairs in our ears do while playing music.*

She spread this idea broadly, looking for someone who could make it happen (on a college student's budget), and found me. We met over coffee and discussed its feasibility, then I used sketchup to design the project alongside her. What we came up with was a seamless box containing *a raspberry pi, break-out board, and power supply that would*

hang from the ceiling. Extending out of this box was twelve hanging jar lamps with fairy lights inside, each lamp representing a tone from the western 12 tone scale.

In order to make the lights play music, I developed a webapp which was served from the pi, in which Sally could choose songs, run patterns, turn on mic input, and control things like brightness, on/off, and fade time. The *hardest parts of this project were getting the FFT to be performant, and designing the 12 female-USBs breakout board* which had to use MOSFETs to step up the pi's 3v3 GPIOs to the 5v power supply for the lights.

Skills Used:

Web Workers

Linux

Micro-controllers

Node JS

Signal Processing

Fabrication

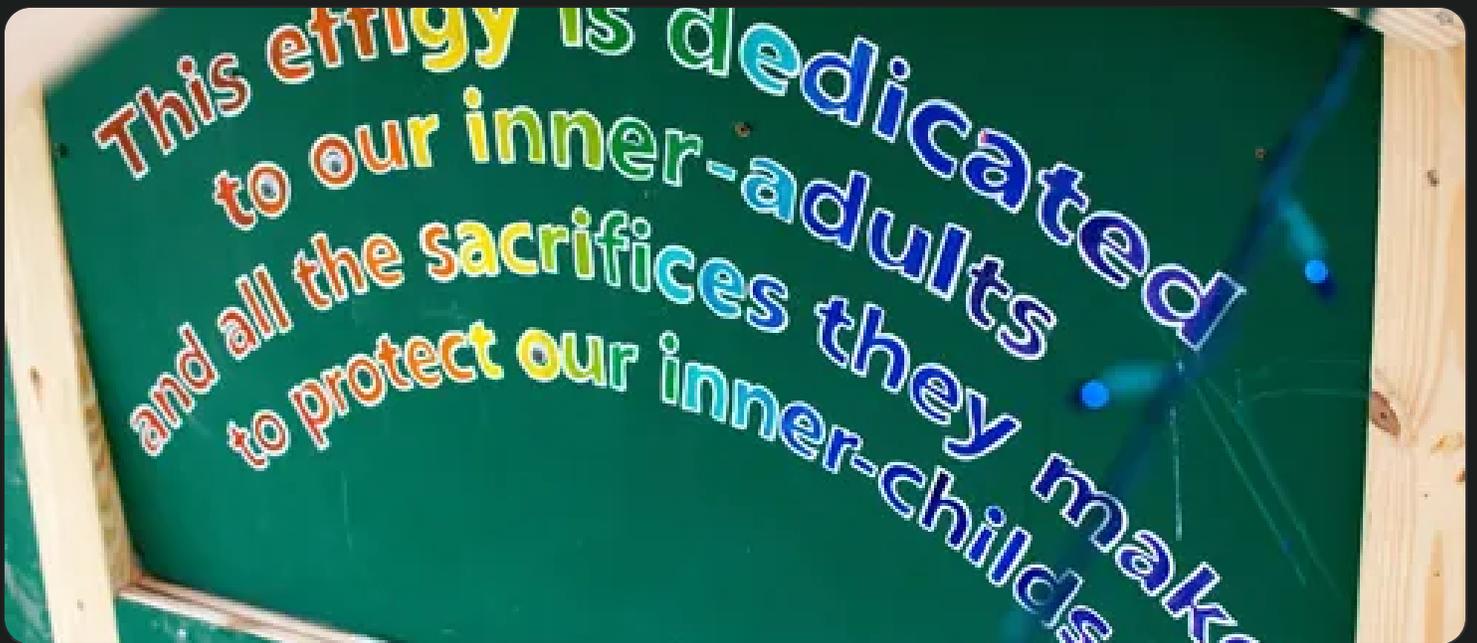
Mobile Apps

UX

Web Audio API

Playwood Palace

Codesigner, Lead Engineer, and Foreman for a large-scale art project based on my childhood castle-playground.





Playwood Palace was *a three story maze and castle-playground shaped vaguely like a unicorn*, built by a volunteer team for the regional Burning Man-inspired event: Flipside.

The winding interior of the first floor consisted of the *cafe/bar, a hobbit home, a mini forest with fake campfire, a greek veranda with blacklight chalkboards, and a dark-room ballpit in space*. Connecting the first and second floor were 1ft tall steps which, alongside the 4ft tall railings, gave participants the perception of being small again.

On the second floor were *two secret rooms*, one of which was full of treasure and required two people working together to open (the door had a pull string latch with the pulling end hidden far from the door). From the second floor, participants could get into both of *the turrets, each containing an aimable flamethrower*. On the third floor was the crux of the piece, the top of *a three-story slide*. Tons of work and volunteer hours went into this piece -- this is what of it I can claim:

- Leadership
 - Always being multiple steps ahead on what needs to be done
 - Showing people easier ways to do things (being mindful not to puzzle ruin)
 - Exemplifying safety and always doing things in ways others could understand
 - Being thankful and appreciative of others
 - Keeping an eye out for the safety of others

- Foreman and Engineer

- Create, maintain, and reference 3d CAD model
- Assurance and testing of sturdiness/strength
- Planning out and testing build tasks (materials, tools, techniques) before assigning them
- Spending ~30 hours a week fabricating the more challenging projects
- Knowing everything currently being worked on, checking in frequently (and congratulating often)
- Co-Designer
 - Came up with thematic inspirations for each of the areas
 - Created the soundscape
 - Co-authored the story in the "childrens" book made for the piece
 - Designed the t-shirts, as well as colorizing/photoshopping images for our swag and the "childrens" book
 - Created the overall canvas which the volunteers filled
- Developer
 - Made the proposal website
 - Created a budgeting tool which calculated the total price of the piece, as well as the materials list
 - Created a media page

More Info

- This site has tons of links to media from the project
http://sephreed.github.io/Playwood_Palace/index.html
- Project Proposal
https://sephreed.github.io/DaFT_2017/
- Step by step build book
https://sephreed.github.io/DaFT_2017/Docs/buildBook.html

Skills Used: Peer Leadership Structural Eng. Architecture Fabrication 3d Modeling Interactive Art
UX Collaboration Roadmapping Task Delegation Volunteer Onboarding Mentorship Website
SketchUp

An in-browser modular-synth inspired DAW (Digital Audio Workstation).



Upset with limitations that no longer exist in modern DAWs (namely, microtonal arrangement), I decided to try my hand at making my own. Inspired by the DAW "Reason," *this project was doomed from the start*. No matter how cool the system for arranging and connecting sources was, **Web Audio API** is just not meant for this level of processing.

Skills Used: [Web App](#) [Node JS](#) [HTML5 Canvas](#) [Synths](#) [Web Audio API](#)

Playa Met

Public transportation project proposal for Burning Man, backed by user research and art car buy-in.



A lot has changed from when Misty and I first started going to Burning Man. In particular, it feels like we haven't gotten on an art car in years. What's up with that? And *wouldn't it be cool if art cars were the cities public transportation?*

This project started out where any decent project should: research. We spent a solid afternoon in the DMV line talking to people in line to register their art car. We asked them about their experiences picking people up, the good and the bad. We asked people about their inspirations, just out of interest. And lastly, we asked them: "If there were 4 bus

stops, and you only ever had to take people from one to the next while in that direction, with no schedule, would you?"

Of course most people say yes to such a question, but it seemed earnest. Some drivers stated they'd do it all the time. They'd stay up doing it. Overall, *the idea was a big success with drivers*. But we also heard over and over again: isn't there already x bus system?

As it turned out, there was a bus system that someone with quite a bit of clout was trying to start. It was terribly designed; we thought so, and the drivers thought so too. It was strictly scheduled with too many stops and.. just a bad idea.

So Misty and I put in a proposal the next year. It included various quotes from our user research, a custom website, and a fancy 3d render of what our bus stops would look like. *Our proposal was denied, so we brought 500 vuvuzelas instead*. We intend to make this project happen eventually, as well as bring even more vuvuzelas.

More Info

► [Project Proposal](#)

https://sephreed.github.io/Playa_Met/

Skills Used:

Blender

Website

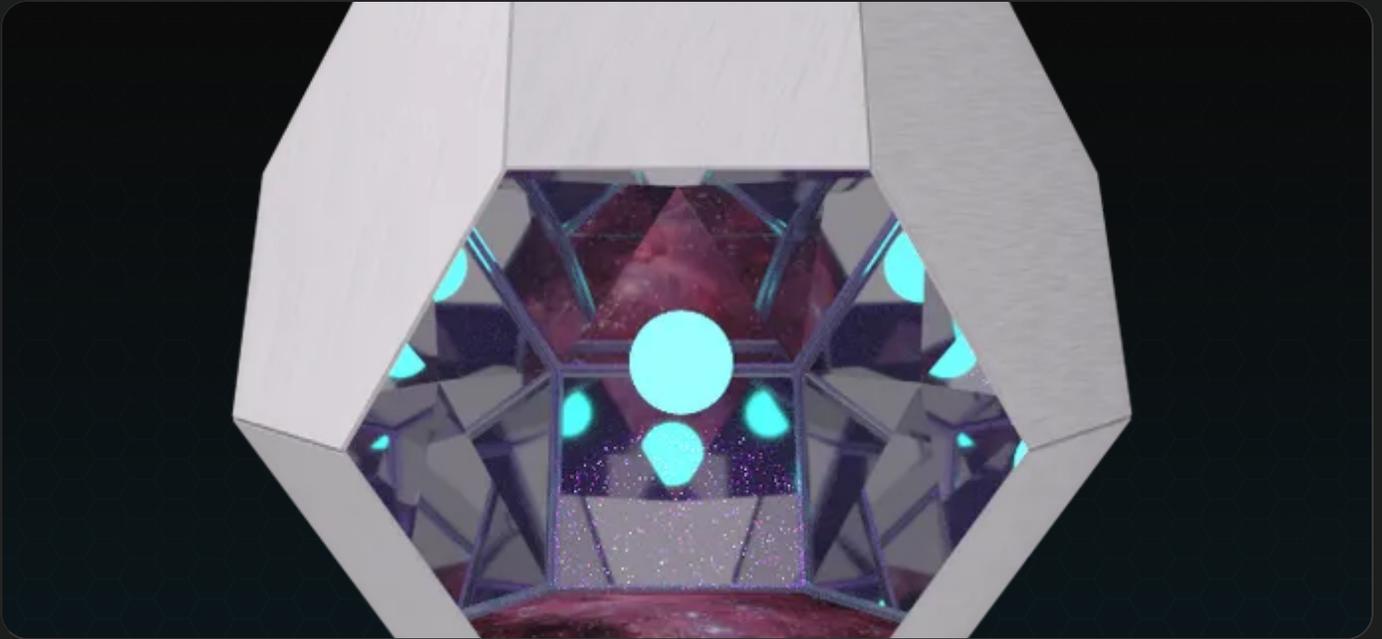
3d Modeling

SketchUp

UX

Hexapod

Project rendering for SXSW art grant submission.



After being impressed with a piece Misty and I worked on called "The Vessel," a couple friends asked if we wanted to collab for SXSW art grant. So we all got together and ideated about what we could make within the scope of the grant. Eventually the "Hexapod" is what we decided on: a neat looking 3d geometric shape with mirrors on the inside; a bit trite, a bit selfie bait, but also pretty cool.

We only ever made it to submitting a proposal, but part of it included a 3d model and website -- the model in particular being a new skill for me. I used SketchUp to draw the shape, and then Blender to add materials and render it.

More Info

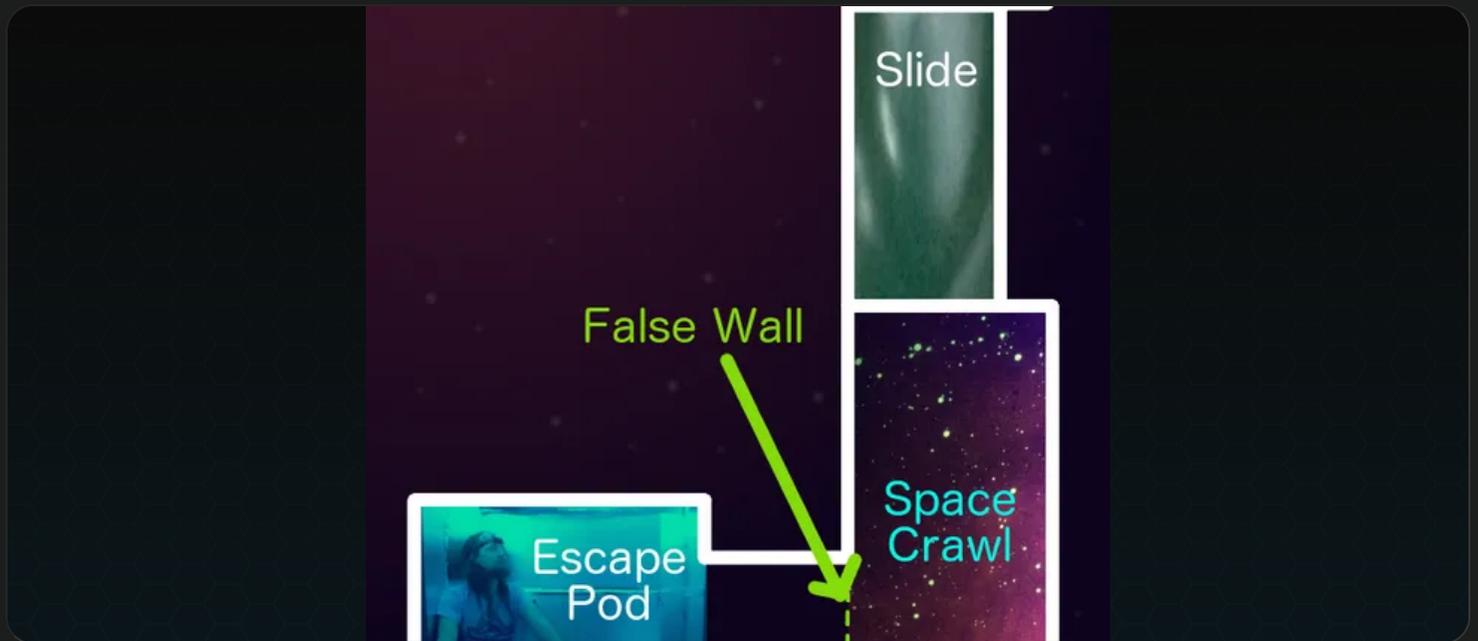
- [Project Proposal](https://sephreed.github.io/Hexapod/)
<https://sephreed.github.io/Hexapod/>

Skills Used: UX 3d Modeling Blender Website Collaboration

The Vessel

Sep - Nov 2016

An exploratory interactive art piece. Our addition was a secret space tunnel, behind a painting of space. Additionally, there was a secret room inside and a slide into ball-pit at the end.





The "Space Crawl" was a section of an art piece called "The Vessel" which was an interactive/exploratory building. The space crawl was usually one of the last rooms to be found as it was a small crawl space hidden behind a painting of space. The inside of the room was lit with black light and painted to look like outer space, planets, and stars and played a 15 minute ambient song I made on loop. At the end of space crawl was a slide that went into a ballpit, and hidden behind one of the walls was yet another secret passageway to a room called "The Escape Pod." It was designed and built by Misty Nickle and I.

Skills Used: [Interactive Art](#) [UX](#) [Fabrication](#) [Website](#) [Collaboration](#)

Web Developer at Stash Crypto Inc

Sole developer for various web services related to a crypto cold-wallet; also did some 3d product modeling and renders.



STASH

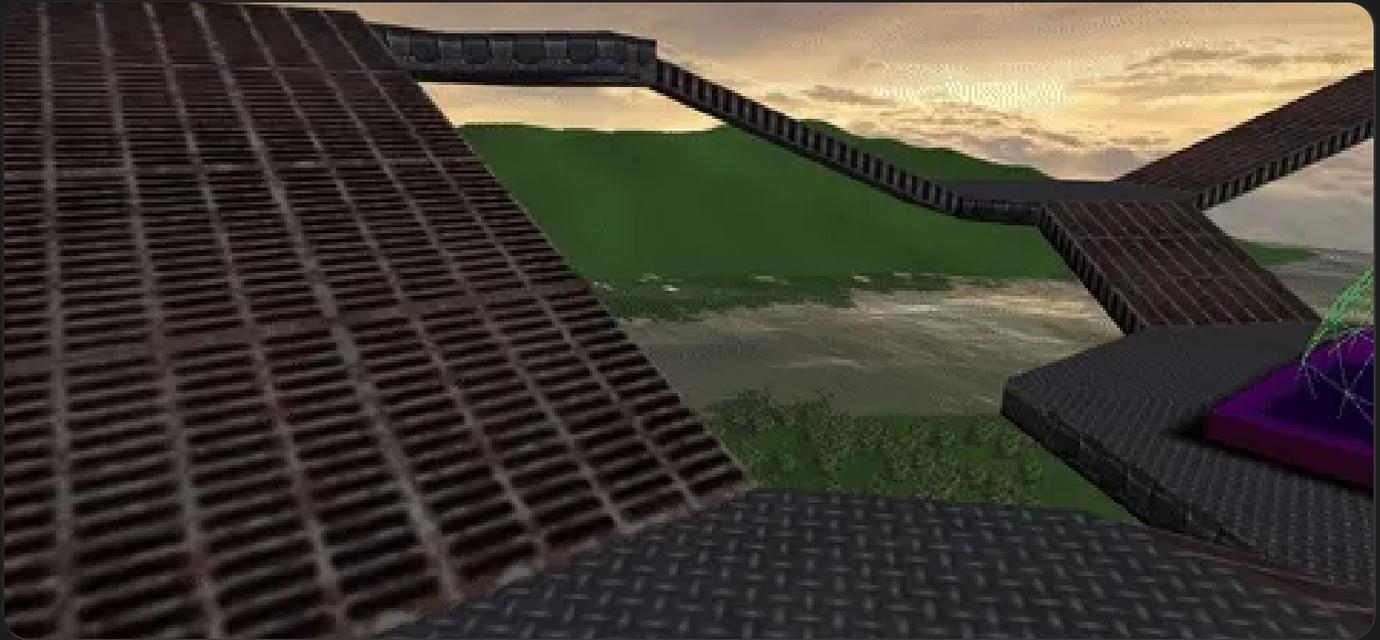
Digiden



I met the CEO of Stash Crypto at a crypto-currency meetup held at the Factom offices, and we hit it off pretty well. He happened to be in need of a web developer at the time. The company direction was often tumultuous, leading ultimately to the disposal of the company identity in an attempt to mimic Apple (a common story in start-ups). I made a 3d model of our original logo and our flagship product, as well as a website for an internet alliance they were attempting to start, prototypes for the digital identity search engine (with AES-EBC encrypted local storage of searches) and the product landing page (which

3d Walkscape

My first time messing with webgl, specifically Three.js. I was attempting to build an explorable scenic cabin in the mountains (as of 2022 I live in one!).



This was a fairly simple project, testing out Three.js to see what it was capable of. The answer is quite a lot for anything in a browser. The project has some very rough physics (the collisions are done with raycasting), perlin noise procedurally generated hills (no random seed), and a few interactive elements (the door to the house and the sphere). I'd like to get back into this project some day.

More Info

- ▶ Play with live demo
<http://sephreed.github.io/walkscape/index.html>
- ▶ Watch screencap
https://www.youtube.com/watch?v=Cu_6l9h4Bl&t=30s

Skills Used: Three JS 3d Modeling Blender Procedural Gen. SketchUp Games

Teacher at Tinkering School

An after-school "maker style" class for introducing power tools, 3d printers, and general building skills to children.

austin tinkering school



Don't worry, my hand was always the one holding the boards down on the chop saw! Such a fun job..

Tinkering School was a sort of summer-camp for tinkering. *We brought in various age group classes, ranging from 4 - 13, and gave them building challenges and a shop.* For the younger ones, it was mostly just hot glue. But for 6 and up we started letting them use drills, hammers, saws... things most parents found astounding when they came in to watch for the last day.

As unsafe as all this sounds, no serious injuries ever occurred. We kept a close eye on the kids all the time, gave them extra small tools, and taught them to do things in ways that avoided risk. If they hammered a finger, we'd get them laughing and smiling again by the end of the day.

My favorite challenges to lead were fort building, and raft building.

Skills Used: Mentorship Task Delegation

Welding Certification

Jun 2016

Safely making two pieces of metal into one; with various methods.



All of the projects imaged above were a result of a introductory welding class. In the class we learned how to do MIG and oxyacetylene welding, along with plasma cutting, pipe bending, sand blasting, and all the safety involved. I've since learned some blacksmithing and stick welding. My favorite welding style is oxyacetylene because it allows for small precision pieces.

Skills Used: Fabrication

Baby Fingers

An interactive music project which used tonal theory to transform the haphazard interactions of users into a ever changing soundscape.



A good friend was building an "Effigy" (large wooden structure to be burned), and wanted an interactive "baby music" element to it. The idea was that the fingers would have paddles as fingernails that would play sounds. He wanted a sort of xylophone/music box sound to it. I ended up taking it a step further.

The final design did play xylophone sounds, but the tones were algorithmically decided to take what would have been an obnoxious and repetitive ambience and turn it into a constantly evolving one. The basic gist of the program was as follows:

- Every 30 seconds, choose a new key from major, minor, or harmonic minor (rare)
- Every 10 seconds, choose a random chord from the key
- Every 5 seconds, choose 8 random notes from a stacking of 3 octaves worth of the current chord, then map those in order to each finger

Essentially, every 5 seconds the notes would move some small amount to either accentuate the same chord a bit differently, or move to a new chord or key entirely. There was also one last rule:

- If ever the baby isn't played with for over an hour, start a never ending loop of wailing

This last rule led to some magnificent prank moments, only ever happening twice over the 4 days; both times around 6am. Other than that, people were playing with it constantly, and it sounded great!

Skills Used:

Audio

Python

Micro-controllers

Interactive Art

UX

Linux

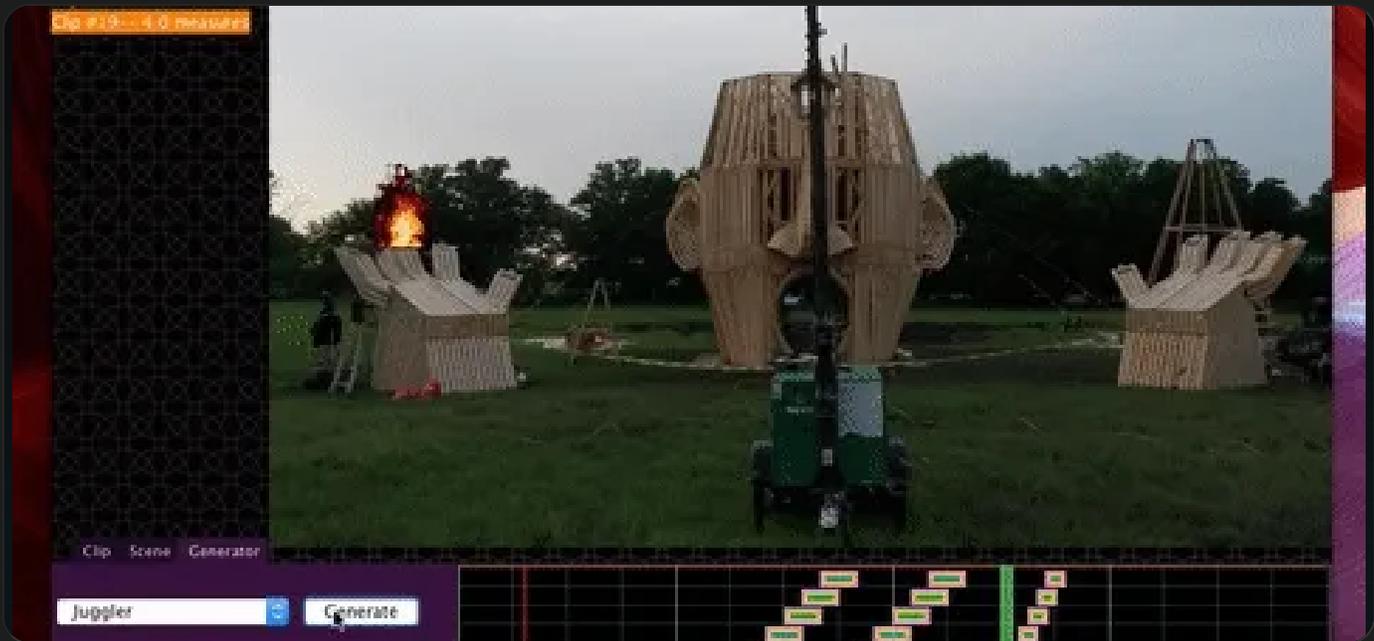
Micro-controllers

Jazz Theory

Procedural Gen.

Effigy Flame Effects Sequencer

Tool for producing and simulating flame effect patterns.



This was my introduction to an Austin community I came to love very dearly: the Flipsiders. The very first project I stumbled into was a four story wizard head, brimming with fun-house style creativity. And out front of it was a pair of hands, facing up towards the sky, with flame-throwers in each finger and palm.

They needed a tech crew to sequence these flame effects, so I took on the role of making the sequences. I was young and excited, so I made an entire Java program for it... with an embarrassing amount of custom UI elements. Many of them were pulled from early projects making sequencers, but still.

The way the program worked was very similar to any other sequencer (seriously, I could have just used a simple midi program), the only major feature being that it showed a simulation of what it might look like and had special tools for generating patterns. It even had its own proprietary file extension for saves, a .feg (eff-i-gy).

In the end, extreme weather conditions (25ft flooding) made the event into a bit of a nightmare for art projects, and the sequences never really saw the light of day.

More Info

- ▶ Video of the sequencer controlling leds
<https://www.youtube.com/watch?v=28CqNBAPzF0>

Americorp Leadership Development Program

Six weeks in the woods, rehabbing meadows and studying the art of good leadership.



How do you get a group of eight ill-behaved teenagers who've been forced to do manual labor for less than minimum wage to *not only meet quotas but have a good time*? The answer: really good leadership.

I don't know if every Americorps group is awesome (we certainly met some groups that seemed less so), but *our leader John was amazing*. He could have easily led any team, but stuck to Americorps because "he needed the challenge."

What makes good leadership is not a subject that gets much legitimate coverage in the modern world. As such, it's extremely rare. But it's an amazingly interesting subject.

There's many different ways of doing it, but they all have a few things in common: *results, and enjoyment*. If the people working under you aren't happy, that's bad leadership. If you aren't getting the job done, that's bad leadership.

Personally, *I choose to lead from behind*. The style is to basically let people go about their own way, approaching problems the way they see fit, while keeping an eye on them whenever they stray from the path you desire, and using minimal force to keep them in-bounds. I prefer rewards over punishment (as does every psychology study). In this way, you *maximize your teams personal agency, responsibility, creativity, and happiness*. Over time, you also minimize the need to micro-manage, which allows for more personal bandwidth.

Please -- if you're interested -- chat with me about this subject.

More Info

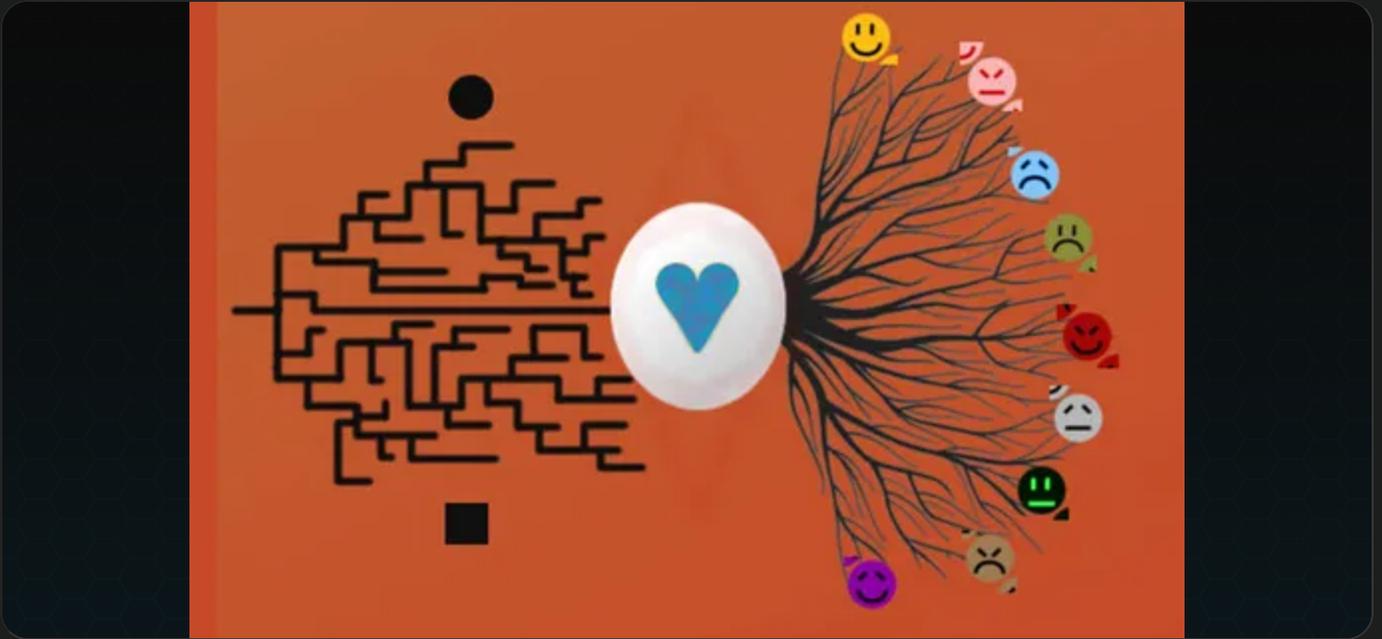
➤ [Photo Album from Season](#)

<https://northwestyouthcorps.zenfolio.com/p869056121>

Skills Used:

Album - A Well Conditioned Lover

Third album; a collection of more happy and uptempo pieces.



This was my third album, built of my more happy and poppy tunes. It takes influence from trance, house, jazz, theater, and video game music. Most of the songs on this album were produced at the same time as the ones from my second album, but were thematically out of place on that album. The cover art is meant to represent the paths of the mind (logic/abstraction) and the gut (emotion/deep learning), and the human endeavor to lead them to each other. This was the kind of heady stuff I was on about when writing most of these songs.

More Info

- Free Stream/Download for "A Well Conditioned Lover"
<https://thumbz.bandcamp.com/album/a-well-conditioned-lover>

Skills Used: Synths Jazz Theory Mix Mastering 2d Art Audio

Album - The Dawn of Sentience

Second album; a collection of my more down-tempo songs.



This was my second album, built of my slower and darker tunes. It takes influence from early uk dubstep, hip-hop, jazz, theater, and video game music. This album is dedicated to sentience in humanity, may we one day find ourselves a culture rich with appreciation for all the beautiful wonders of the universe we've been gifted access to. May we one day live comfortably amongst the stars.

More Info

- [Free Stream/Download for "The Dawn of Sentience"](https://thumbz.bandcamp.com/album/the-dawn-of-sentience)
<https://thumbz.bandcamp.com/album/the-dawn-of-sentience>

Skills Used: Synths Jazz Theory Mix Mastering 2d Art Audio

Album - Source

First album; a collection of experimental music, using exclusively from-scratch synthesized sounds.



Source is a compilation of all the tunes I still had laying around from my introductory days of music making. It has a very "raw" sound and is all-over-the-place thematically; very experimental.

The core goal of all my music during this time was to not use any pre-made synths, sounds, or recordings. Pretty much every single sound was made from scratch; hence the "raw" sound.

More Info

- [Free Stream/Download for "Source"](https://thumbz.bandcamp.com/album/source)
<https://thumbz.bandcamp.com/album/source>

Skills Used: Synths Jazz Theory 2d Art Audio