

Torching Silence

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Project Description

Torching Silence is a representation of the Statue of Liberty torch, a symbol of hope and inclusion: "Give me your tired, your poor, your huddled masses". Our torch functions as a universal sign holder, allowing protesters to unite with each other as a collective symbol. During the protest, the torch lights up to the rhythm of the chants. After the protest, people can display the torch as a beautiful piece of decor in their homes, reminding them everyday of the values they stand for.

Observational Documentation

In order to truly understand what protest accessory a user would need and use, we decided to go to a protest that was occurring near us. At the time, there were several protests in response to President Trump's executive order, banning "radical Islamic terrorists."

The Scene

We decided to attend a large protest in San Francisco, NoBanNoWall on February 4th, 2017 from 3-6 PM. On the day of the protest, we arrived early, so we could see how the day would unfold. There was a main stage where speakers would share their personal stories one by one (for about 10 minutes each). We videotaped several scenes, chants, and gatherings. It was evident that there was a strong celebration of inclusion, diversity and community. The crowd would chant in unison to the speakers' stories. Below is a picture from behind the stage:



Caption: *Speakers on stage at NoBanNoWall protest in San Francisco telling their personal stories.*

User Interviews

Throughout our time at the protest, we interviewed 10 people in attendance (about 5-7 min each). We spoke with people from several backgrounds, ages and personal causes. Here are some key quotes from the interviews:

Interview 1: Young woman handing out fliers to call local representatives

Question: *'Do you feel personally affected?'*

- Yes, I am an immigrant
- But, this isn't about groups of people
- This isn't about republicans, or Donald Trump.
- This is about making checks and balances easier to function

Question: 'How would you make this job easier?'

- Most effective channels
- Helping groups of people connect

Question: 'If your message could be heard around the world, what would you say?'

- Silence is the most dangerous thing
- Silence is extremely dangerous
- If you are angry, scared or worried, speak up
- This isn't about Donald Trump, this is about if you want to fight for what you believe in this country
- Facebook and tweets don't help, it is calling your representatives to make voice heard



Caption: Woman handing out fliers to call local representatives at NoBanNoWall protest.

Interview 2: Older woman

"What brought me here is basically oppression of people given new administration."

"Not my first march. Been in many many over years.

But this seems to have urgency because this man is moving pretty quickly.

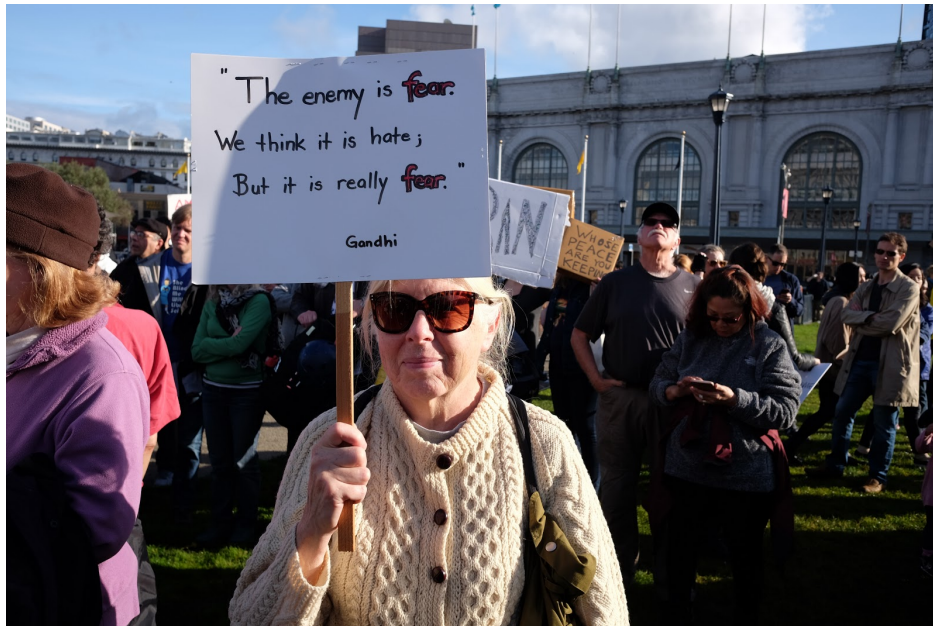
Fear/not hate - I like to keep positive. I'm a great admirer of Ghandi

His way of peaceful protests/peaceful resistance."

Question: 'How would you compare this protest to others in the past?'

"These have been very peaceful, but they have been large. It is apparent to me that a lot of people are not in favor of the presidential decisions."

Question: 'If your message could be heard around the world, what would you say?'
"Mister trump is not my president, because he doesn't represent what I believe in"



Caption: Woman at NoBanNoWall protest.

Interview 3: Older woman

Question: 'Can you tell us about your sign?'

- Overall feeling I have is very scared, very anxious. Has affected daily life. Can't eat can't sleep.
- Not alone.
- Strong anxiety and fear.
- Not alone, feelings like this around the world.
- Need to tell _____ that this is not okay, humane, etc.
- We've been lucky the past 8 years.
- Many many people are suffering.
- Rallies, calling, writing, etc.
- One person's actions can make a difference.
- Every action/every person counts.
- Even daily being nice to each other.
- More so now, but every day every day.
- Sense of anxiety
- There is no personal incident.
- But, I feel the psyche of the country has changed.
- Its not that I don't feel safe,, I'm a little more attentive now since Nov. 8th.

- That night really changed me.

Question: 'There is a sense of community around here, do you feel different here?'

- Yes, yes, I do. Glad to be in bay area, because don't have to go far.
- But, don't want to take it for granted.
- I feel like it is 1930s fascist Germany in 2017.
- Hoping most people would see Trump as inhumane
- Was hoping there were so many checks and balances along the way.
- People on cabinet make her scared.

Question: 'If you could send a message to the world, what would it say?'

- Truly America is a really great country. It really is.
- Don't want people around the world to judge America based on the administration.
- We will do what it takes to mark the wrongs of this administration.



Caption: Woman at NoBanNoWall protest.

Interview 4 & 5: Young couple (male is Australian Immigrant)

Question: 'What brought you here?'

- We disagree with the policies the president is implementing
- Australian by birth
- Citizen of US now
- Okay for me because I'm from Australia, but here to be vocal for others
- Disagree more and more with what is happening

Question: 'How does this make you feel?'

- Makes feel not alone
- This is the first time protested in a very long time

Question: 'Are you going to keep protesting?'

- We will do whatever we can
- Protesting
- Turn house and senate over soon

Question: 'If you could blast recording to whole world what would you say?'

- Oh that's a big question right
- I would say that America is great, already great.
- That is what this country continues to need to do.



Caption: Young couple at NoBanNoWall protest.

Interview 6: Socialist advocate (did not want picture)

Question: 'What brought you here?'

- We are revolutionary socialists
- We think no trump....we think not our system

Question: 'What's the best way to achieve change now have you have opportunity?'

- Chance to see you're not alone
- Brief, real injection of political hope
- But, doesn't rely just on a protest

- America goes to work every day (buses, trains, shipping containers, etc.)
- But to make fundamental change need protest of middle class to real working movements from the working class (many of which voted for Trump as well)
- That is where you will really start to see change

Question: 'How can we take it to rally everyone to take those steps'

- Being an activist to being an organizer
- Small discussions, tables, leaflets, ex: if students go on strike that doesn't have much power

Question: 'What would be the tipping point here?'

- Reality.
- It will make some feel nationalistic
- For some people it will make them outraged.
- When cut environmental restrictions, another group will be in the movement
- Rules against protests, this will bring more people
- Attacks on people's health care will mobilize people
- But, mobilize them to do what? Vote for politician that promises to do XXX.

Interview 7 & 8: Young couple (woman and male)

Question: 'Can you tell us why you came here today?'

(female)

- This is a time when there is a need to have a very strong collective voice.
- After everything that has happened in the first few weeks of presidency
- Not first march, I flew to WA DC for the women's march

(male)

- It feels empowering to see so many people come out. You see a lot of different communities coming out to protests

(female)

- It's a nice antidote to the news to be here
- News can be disheartening
- Being here with the people feels uplifting

(male)

- There are a lot of people to fight for

Question: 'What is the best way to make a change?'

(male)

- I think change really starts by talking with people in your own community. There is a lot of hate and bigotry in all of us. It is important to talk with one person you can talk to and change your mind about something.

Question: 'If there was a message you'd broadcast to the world, what would it be?'

(female)

- Oh god, oh gosh, that is a big questions. It's important that everyone is equal. Equal rights....

(male)

- Sigh. I think the only thing I would want the world to know is just that we aren't going to be silent. This is going to be different from other efforts in the past to build barriers. And we aren't going to let it pass.



Caption: *Young couple at NoBanNoWall protest.*

Interview 9 & 10: *Young couple (woman and male)*

Question: 'What brought you here and what motivated your sign'

- First protests I ever really planned to come to
- Disagreed with everything happening in trumps presidency
- Made sign to show

Question: 'What does coming out here mean to you?'

- I was thinking a lot about that, because I've always been hesitant about protests
- There is a whole range of views here

- It is cool to see everyone come together to see

Question: 'Do you feel empowered?'

- I don't know. We are still kind of on the outside edges since we are here.

Question: 'How do you plan on continuing?'

- Calling and writing to members of congress to ____ what I support

(male)

- I personally haven't been to any of the countries affected
- I do need to do more research about the orders and what we can do about citizens of America.
- Being here with all of these people that make san francisco so great.

Question: 'If you could boom a message across world, what would it be?'

(male)

- America is about open arms and welcoming people across the world.

(female)

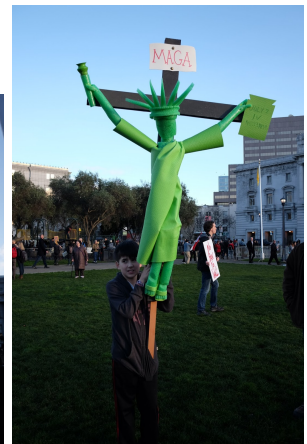
- I don't want Trump's policies to be the reflection of america. Open arms and show everybody love.



Caption: Young couple at NoBanNoWall protest.

Signage

We continued to notice several posters that were referring to the Statue of Liberty. Many people had quotes from the poem on the Statue of Liberty. We felt as though this was truly the unofficial symbol of the protest.



Caption: Statue of Liberty signage a central theme to NoBanNoWall protest.

Additional photos



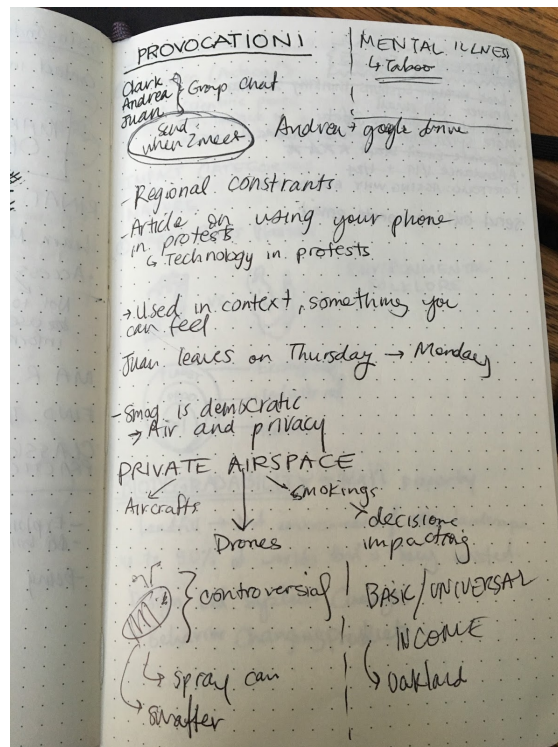


Caption: Scenes from NoBanNoWalls protest depicting diversity, inclusion, and community.

Design Process Documentation

Initial Brainstorming

In our first meeting, we met to discuss some causes we felt passionate about. We touched on advocating for mental illness, bees, and airspace. We wanted to constrain ourselves to regional groups and events.



Caption: Meeting minutes from first brainstorming session.

During our second meeting, we went over the protests that were happening in our area over the next few weeks. At that meeting, we decided to attend both the Milo protest at Berkeley and the NoBanNoWall protest in San Francisco. We then narrowed down our thought process into user groups of interest.

MEETING #2: CRITICAL MAKING (01/30)

① PICK CAUSE

② USERS

③ BUILD

Tracktrump.com

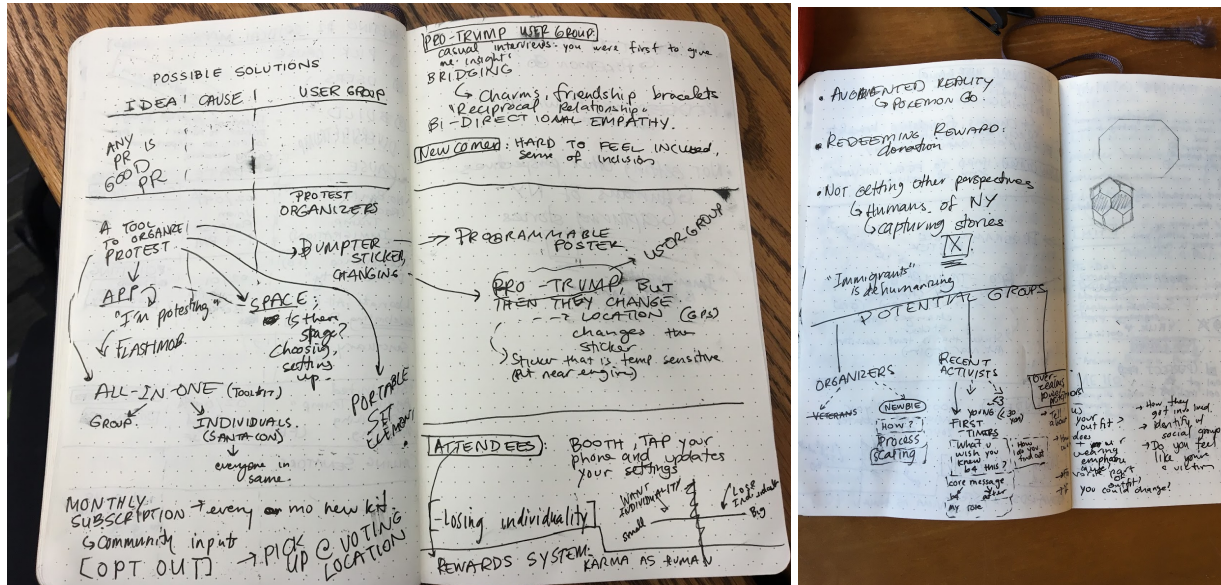
- Friend of Andrea brought printer to Airport b/c ppl couldn't use airport. mat!
- Calling Senators

CAUSE	DATE	USER GROUPS
No Ban No Walls (Racist Orders Trump. IMMIGRATION)	02/04 Union Plaza, SF 4-7 PM	FIRST-TIMER!
• Resistance (FB) "Dance Party"	02/01 6-10 PM Berkeley	• CHATTING NEED TO WRITE STRATEGY
Neonazi, Alt-Right Celebrating Diversity		
Sanctuary Cities/States	?	
"SF United Against Trump" Organizing Meeting (FB)	02/04 1-3 PM Women's Building SF	FIRST TIMERS ORGANIZERS
CALLING SENATORS		

not quite sure of how to go

Caption: Meeting minutes from second brainstorming session.

In the same meeting, we ran an informal ideation brainstorming session, to try and generate as many ideas as possible, based on ourselves as users in protests. Due to the timeline of the project, we felt as though it was important to ideate from the beginning:



Caption: Ideation notes from second brainstorming session.

At the end of this meeting, we decided we would attend both the Milo Protest and NoBanNoWall SF protest. We wanted to informally interview 3 specific user groups within the protest (picture on the right):

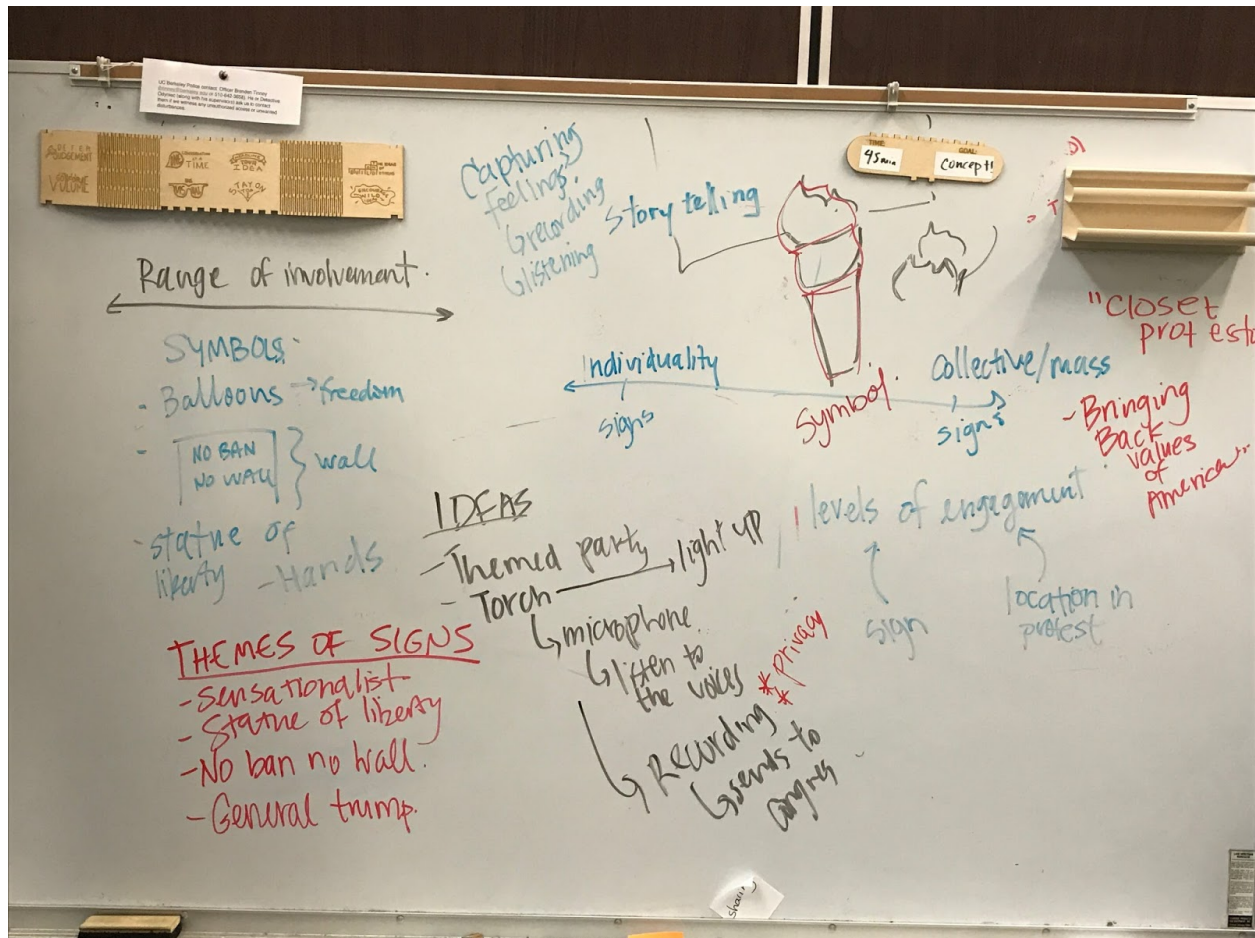
1. First time protesters
2. Organizers of protests
3. "Power Protesters" (dressed in costumes or really loud signs)

Empathy

Our plan was to attend the Milo protest, but because it got too violent, we felt it was unsafe to attend. Therefore, we only attended the NoBanNoWall SF protest. Initially, we had some leads to speak to the organizers, but unfortunately were unable to. Therefore, during our observations and interviews, we focused on speaking to first time protesters and passionate protestors. Our user interviews and field notes are in the section titled Observational Interviews.

Interpretation & Directions

Based on our user observations and interviews, we reconvened to discuss our biggest takeaways. We discussed things that were most surprising, unique conversations, and solutions that had come to us at the protest. One of the biggest concerns for us was time to build, so our **goal** for this meeting was to interpret our findings, generate a list of needs, create directions for our design and ultimately, begin to develop potential solutions:



Caption: Ideation notes from third brainstorming session.

List of Needs:

- Needs to be reflective of the American values of inclusion
- Needs to create a sense of community and unity
- Needs to still maintain individuality
- Needs to be a call to action for people outside of the protest space
- Needs to not interfere with normal protest action

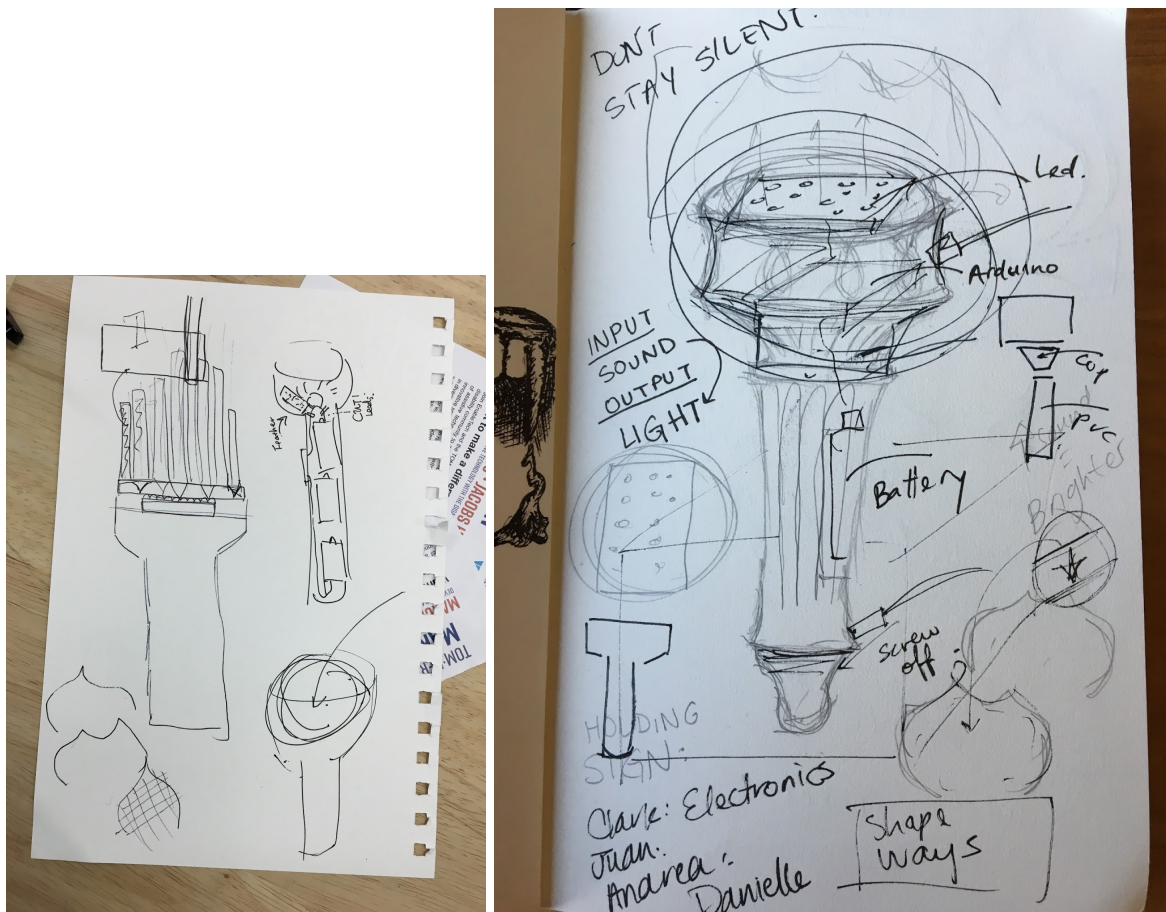
Design Principles:

1. Include or allude the Statue of Liberty (words, figure, color)
2. Create a sense of community when people use the design
3. Must allow for individuality or customization
4. Encourage users to speak up and take action after the protest
5. During use in protest, the device should encourage chanting or other protest actions

Solutions

Ideation

Our next meeting was in class. The goal was to formalize some of the ideas we had brainstormed in the previous meeting and discuss our next steps:



Caption: Initial sketching of the torch and flame design.

An important design decision of this meeting was conceptualizing how we wanted the torch to look like. One possibility was to replicate the design of the actual Statue of Liberty torch, or we could choose to take a more abstract route, or meet somewhere in between. A realistic Statue of Liberty torch, with its delicate design, would be challenging to manufacture, even with 3D printing. Indeed, 3D printing fine details tend to result in a very poor surface finish and overall poor aesthetic look. Therefore we decided to go with an abstract design that would look much cleaner once fabricated.

We also explored the possibility of designing the torch in a way that it could be hacked together using regular home objects, such as a flashlight, such that anyone could build one at home. The goal being to make having the torch more accessible. However, we concluded that opening a flashlight apart and rewiring the circuit was something most people could not do, making our “hack at home” purpose less attractive.

Finally, we decided we should make the handle of the torch detachable so that protesters can display the base in their homes.

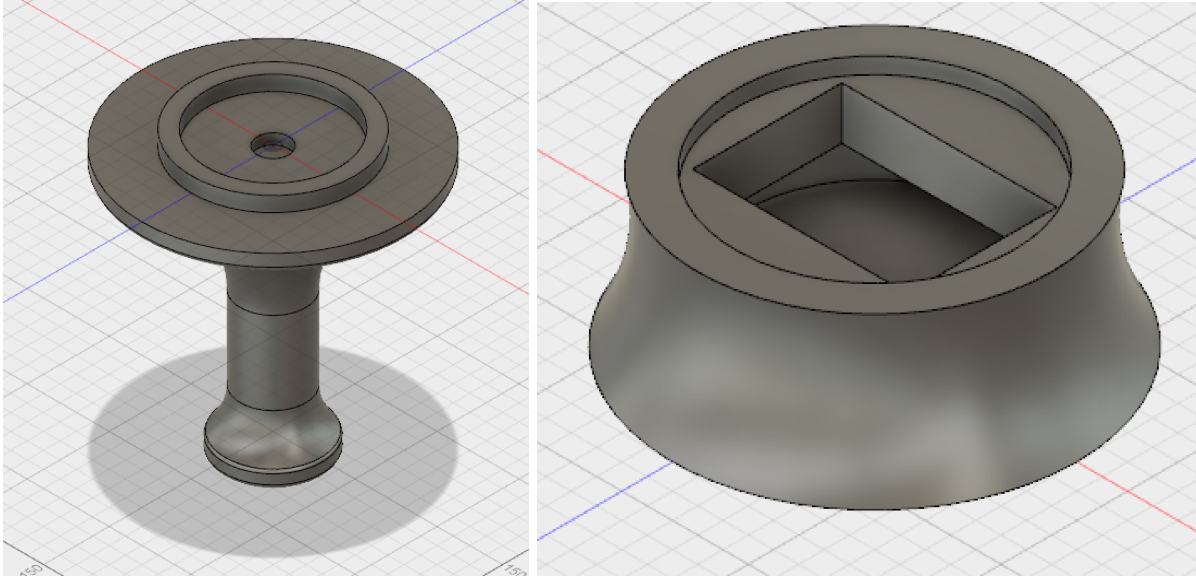
After settling on the Statue of Liberty torch symbol, we began to notice the media latching onto the symbol as well. Lady Gaga’s Halftime Show at the SuperBowl relied on audience members in the crowd waving lit up cylinders - potentially abstract representation of torches. The New Yorker cover image was an illustration with the Statue of Liberty torch flame burning out.

Prototyping- Testing and Selecting

Handle/Base Design

We considered three manufacturing possibilities for the handle and base of the torch: 3D printing, foam core, and laser cut wood with living hinges. The advantages of foam core and wood were that they are much faster than 3D printing, meaning they would allow for creating multiple designs and experimentation. However, we concluded that the quality of the finished product would be superior with a 3D printed part, especially if we spray painted it and coated it with a finishing spray. For this reason we decided to pursue the 3D printing option.

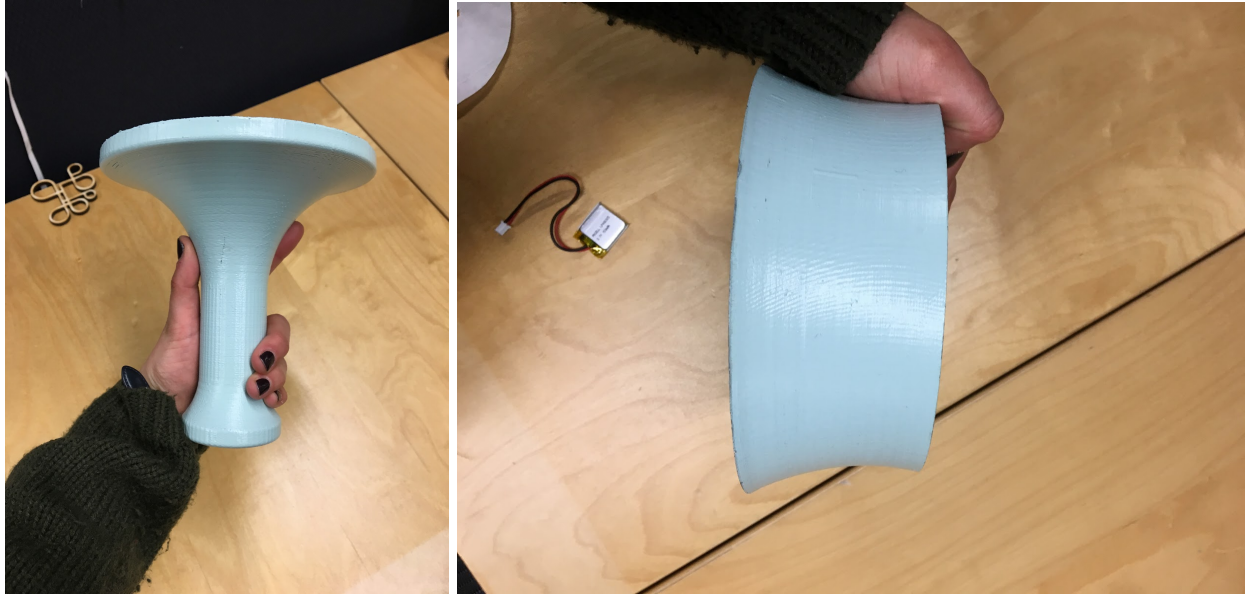
The parts were designed using Fusion 360 as two separate bodies: the handle and the base. The base and handle were designed to be mated together by inserting a circular ring on the top of the handle into a circular slot on the bottom face of the base. A tolerance of 1mm was chosen to ensure proper fit.



Caption: Fusion 360 model of the handle (left) and base (right) of the torch.

During the 3D printing process for these parts, we encountered several problems with the bottom face of the parts warping, resulting in a non-flat bottom surface that prevented proper assembly. After doing research, we understood that this warping occurs when the hot plastic coming out of the printer's nozzle cools down too quickly, making the plastic shrink and peel off the printer's bed. To fix this issue, we raised the temperature of the bed and disabled the printer's fan. This allowed the plastic to cool down at a slower rate and not deform. This fixed the problem.

Once the parts were printed, we proceeded to apply to them several light coats of primer, followed by three coats of spray paint and 3 coats of satin finisher.



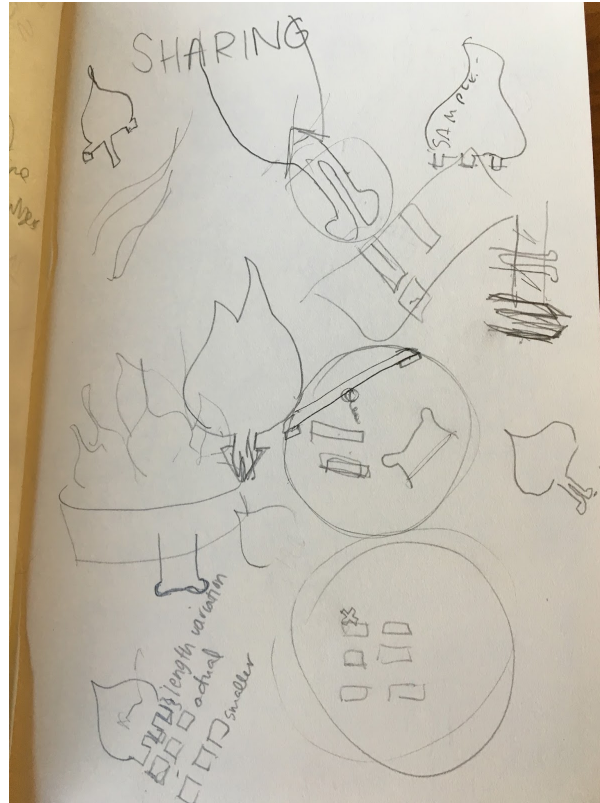
Caption: Torch handle (left) and base (right) after painting.

Acrylic Flames/Lid

Connection (Flame to Lid)

During our design process, we thought it might be interesting to have the flames detach from the lid, the purpose of this would be that you could customize every flame and potentially trade while you're at a protest. Additionally, we didn't want to glue the flames to the lid, in fear that the glue might absorb some of the light and not allow for the full effect.

While at Jacobs, we collected scraps of 1/16" acrylic, to test out different variations of pegs to socket. The idea was that each flame would have a peg that would fit snugly into a hole in the lid. At first, we sketched different connection types and researched how others connected acrylic pieces without glue.



Caption: Illustrations exploring flame peg to base connection without glue.

We then tested out a few of these designs (using Illustrator to model) and then laser cut. What we found was that the width of the hole (for the peg) had to be significantly smaller than the width of the peg. This was the only way to ensure that the flames wouldn't fall right out of the hole. However, the width of the hole couldn't be too small, or else the flame would not fit at all. During our first run, we cut out a series of hole sizes, took note of the dimensions, and tested with one peg size. Additionally, we wanted to see how rastering looked on this acrylic, so we wrote some text to check:

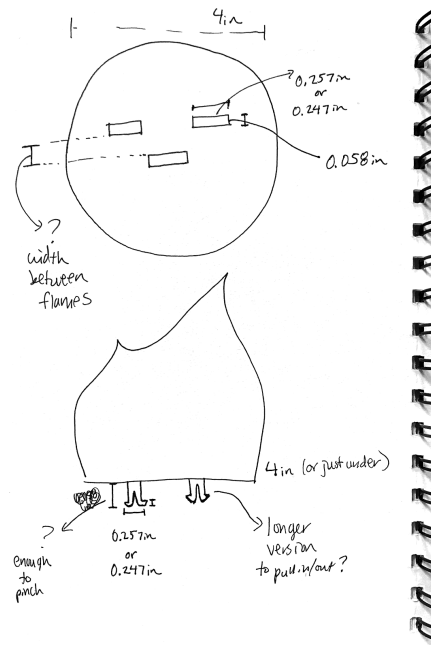


Caption: Test Illustrator file for laser cutting. (Left) varying peg hole sizes. (Right) varying rastering levels of text.

Findings

- Peg hole dimensions can be within the range of: W: 0.247" to 0.257" and H: 0.058"

- The peg connector does not need to have a lip for easier removal, but should have a section cut out for flexible removal



Caption: Illustrations showing whole on base (top) and pegs on flames (bottom)

- 2 pegs per torch should be enough for the peg to stay in place while also being easy enough to remove



- We wanted to use some flames to hold up a sign, 1/16" acrylic is too flimsy, so we used a thicker acrylic for these flames
- For the same reason, we needed to use a thicker acrylic for the lid
- Rastering of the text diffuses light nicely, but anything other than completely black will not show up on the acrylic
- You can't cut the holes too close to each other, because the laser cutter will simply create one giant hole. For flames that are close to each other, we staggered the peg holes.

This connection port actually proved to be the most frustrating part of the design process, mostly because the variations between different laser cutters was significant enough that a snug fit after one cut would be a loose fit on a different cut.

Flame Design

For designing the flames, it was easier to use Illustrator over other modeling software. Using a tablet, we were able to hand draw flame designs, which gave a much more organic look to the flames. Our goal was to use several flames in series to create a 3D effect.

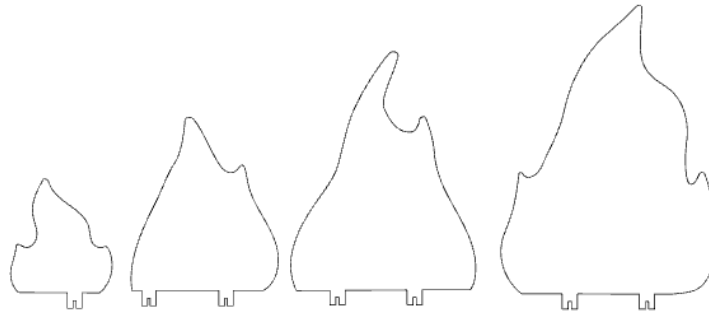
We wanted to include writing, as the rastering had a very nice effect with the light. In the spirit of the Statue of Liberty, we used a portion of the poem that we saw people using at the protest. It was easiest to create this design in Illustrator as well, because the writing could be arranged in a way to ensure that every phrase could be read when the flames were stacked together:



While we wanted to have a really realistic flame design, we quickly realized that sharp tips would actually be really dangerous (and make the design a weapon, which was definitely not our intention):



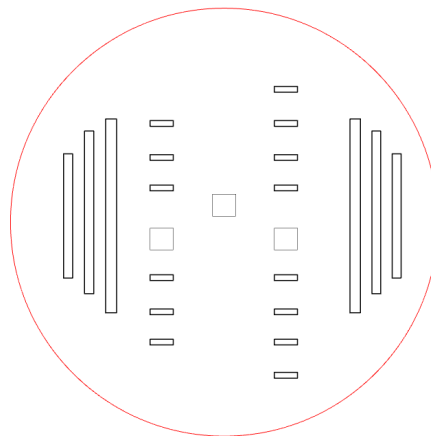
So, to mitigate this, we simply changed the design to have more rounded edges:



Caption: Final Illustrator flame designs.

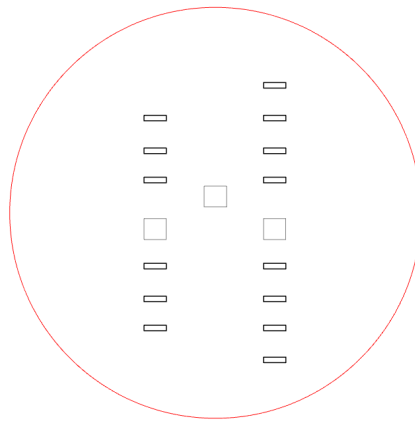
Lid Design

Once we knew the necessary dimensions of the pegs, the lid design was fairly simple. The dimensions of the base had to fit perfectly into the 3D printed base. At first, we thought that the lid had to have grills so that sound could come in, however, after testing, this was not necessary (the microphone was very sensitive):



There were 2 critical design elements:

1. Because the middle flames were being used to hold up the sign, we had to use a thicker acrylic ($\frac{1}{4}$ ") and they had to be positioned in a way so that cardboard could wedge between the two. However, the holes couldn't be too close to each other, or else the laser cutter would cut one big hole. Therefore we decided to make one the flames have only 1 peg. The distance between the two was slightly smaller than the width of a normal piece of cardboard.
2. The flame that would hold up paper (if the user didn't use cardboard) had to be positioned in a way so that the space between that flame ($\frac{1}{16}$ ") and the $\frac{1}{4}$ " middle flame would be very narrow.



Caption: Final Illustrator flame base designs.

Assembly

The flames fit nicely into the peg holes (when they were cut on the Green laser cutter). We intentionally cut more holes than pegs to let sound through the acrylic base. We found it easiest to remove the entire flame assembly from the base of the torch by pulling on the 1/4" flames. When we put the LED into the base of the torch and then the acrylic base directly on top, you could see the nodes of the LED grid, which was distracting. To mitigate this, we tried putting a buffer material: paper, tissue, and trace paper (in Jacobs). Paper was too thick, and the tissue was too thin. The best material was the trace paper, as it diffused the right amount of light and kept its shape after use. Additionally, we cut out a couple of holes on the paper (aligned with the extra holes on the acrylic base) to let in more sound to the microphone.

Code Explanation

Goal: make the Neopixel light module responsive to sound input.

- Low Sound: Blue light
- Medium Sound: White light
- High Sound: Red light
- In each of the above stages:
 - Take the sound input from the microphone as a voltage
 - Depending on which interval the voltage falls under, that determines the color of light
 - Get the appropriate amplitude; e.g.: How bright should the Blue/White/Red be?
 - $\text{Amplitude} = \text{sound_voltage} / \text{interval}$ where interval is 5.0/3.0 since default sound voltage is between 0 and 5, and there are 3 intervals (in our case, Blue, White, Red)
- Modifications

- Of course you can modify which colors you wish to use, as well as the sensitivity of the microphone by playing with the interval boundaries (e.g.: the 'if' statements corresponding to the color determining code)
- Future Hacks
 - You can also add in a variable resistor knob that you can use to adjust the sensitivity on the fly without reprogramming; great for real-life protest scenarios.
- Side-Effect: Also responsive to music and can liven up any ambience.

Iterations:

- Light Color:
 - Debated whether to use more complicated light patterns rather than just amplitude responsive 3 stage coloring; tried using color wipes, color wheels, etc. but all attempts looked very busy.
 - Eventually decided on just using amplitude responsive 3 stage coloring because it looked pure, simple, and beautiful.
 - The simple 3 stages would also allow the torches, if carried in numbers, to sync up nicely and provide a sense of solidarity to the protesters.
- Microphone Calibration
 - It took many iterations of adjusting the sensitivity of the microphone to get it just right in terms of responsiveness when the hardware was fit into the torch and covered by the acrylic piece.

Future Iteration

In the next iteration, we'd like to implement the capability for a user to touch the torch base when it is sitting at their home and the torch plays back the 'light show' (i.e. pattern of light in response to the audio fluctuations from speeches, chants, and cheers) as a reminder of the comforting community experienced at the protest and the collective voice as a call to action.