Muse

Design Documentation

Team Members:
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Timeline of Work

There are dates for different meetings we had, thoughts and notes from these meetings, and things we worked on during these times.

Tuesday 10/29 [in class]

- Scheduling meeting at 8 with note that this will be a longer meeting
- Come prepared for meeting @ 8
    - By watching Zoom Class 10/23 video on Canvas

  To-do:
    - Everyone write your paragraphs for the intro
    - Deniz puts them together and submits on friday
    - Main page: zariah
    - Help page: deniz
    - Kaitlynn: saved works page
    - Eshanya: intro page (logo)

Tuesday 10/29 [8:15pm-9:50pm]

Met in the library to discuss the intro draft
Took a boba break to milk and honey!

Wednesday 10/30

- Wednesday class is flipped, see pre-class notes on the websites

Friday 11/1

- Project Intro due 11:59PM

Wednesday 11/6

- WoZ Figma prototype due - Finished!
- Wizard of OZ Feedback Notes added to this doc during class

Wednesday 11/6

Started implementation.
Done:

- Two large circles change color when different colors are chosen from the palette
- The sliders adjust tint, shade, and saturation
- Created all pages and connected them with buttons
- Attached audio to colors

Monday 11/11

Code Party

- Minimal Functionality finished
- Click works
- Colors are merging
- Sounds are created with different colors
- We have different pages linked and set up

Tuesday 11/13

General Tuesday Meeting

- Met at library
- Made State Diagram
- Discussed things we want to change/ reflections so far
- Decided to try implementing users get to choose colors for specific sound

Things we need to do after Woz:

- Visual aesthetics
- Adding volume, speed, and pitch functionality to the sliders
- Adding the save mixture functionality
- Making the audio play at the same timeAdding the selection circle
- Adding the logo

Monday 12/2

Delegated who would work on each part of our final research paper.

a short abstract (max 250 words) - Eshanya
an introduction (~1 page) - Eshanya
a methods/tool section (~1.5 pages), including figures showing your tool

- A paragraph describing your formative studies and how they lead to your design goals - Eshanya - 750 words
- A paragraph summarizing your different design iterations to get to the final tool - Zariah
- A paragraph that is a “tool walkthrough” describing how a potential user would use the tool and describing its features - Deniz
- A paragraph describing how the tool was implemented, e.g., what libraries did you use, any stand out development insights or challenges - Kaitlynn
- At least 1 figure of your tool, ideally showing multiple states - Deniz
- Optionally, figures of earlier designs (like your wireflow or Figma) to be referenced during the design iteration paragraph - Zariah

an evaluation section (0.5 pages) - Deniz
a short limitations/future work section (2 paragraphs) - Zariah

a short conclusion (1 paragraph) - Kaitlynn

Milestone 1: Ideas

Each team member submitted ideas for creative tools they would like to bring to life. After a decision process, each team member decided to join the Muse team. Muse was initially presented by Kaitlynn Gray as a tool where users can alter properties of a color, such as brightness, to create different sound outputs. They could then compare color “sounds” to each other to help distinguish their differences using audio, rather than visual, cues. This initial proposal was intended to be a tool for those with colorblindness to understand how colors differ from one another.

Milestone 2: Needfinding

To help structure our project, we conducted a needfinding process. This helped us determine how we should design our project to best suit the actual needs of individuals, instead of needs we may believe need to be met.

Needfinding Interviews:

We created a shared interview guide to help identify who we wanted to interview, what areas we were looking to gain insight from, and the questions we would ask to achieve this. *Interested in seeing the raw interview notes? See the “Interview Notes” section of the Appendix.*

Who should we talk to:

- Music majors
  - Ask about elements of sound
- Art majors
  - Ask about elements of color
- We want to find people with synesthesia.
- Also, chromesthesia -> interpreting sounds to colors

Background Notes:

For those who have trouble with vision, how do they currently distinguish color?

Two-sided:

- For those with lower vision, making colors more accessible through sound
- For those with lower hearing, making sounds more accessible through color

How do we conceptualize color through sounds, and sound through color?
Colors are more set, sound is more fluid, and we could get lost in trying to assign colors to sounds- might be easier and more powerful to assign sound to color

Transcending language

- Make sure sounds are language-neutral

Natural sounds vs. tones

- The ocean is blue vs. this tone is blue
    - So there is no sound bias

Interview Questions:

1. How would you describe your learning style? Ex: visual, auditory, kinesthetic
2. Does gamification allow you to learn faster and easier?
3. Have you heard of GarageBand?
    - How was the learning curve? Easy? Hard? What made it easy/hard?
4. How would you describe your relationship with music?
    a. Have you tried to create music? If so, could you tell me about a time where you faced a barrier when creating music?
        i. How would you describe this barrier?
        ii. Could you share with me some resources you hope to have when creating music?
5. When you hear __, what color do you associate that sound with? (random tunes)
    a. https://open.spotify.com/playlist/1XdB7RNvmhFWBIgNkpjeVm?si=sMQxFKY1QV6gN2w_UhL9iQ
6. Do you associate shade with volume or pitch? Is a darker shade a deeper voice or a louder one?
7. What are some elements of sound that stand out to you? Bass, treble, pitch? How would you relate them to your understanding of color?
8. Could you describe your favorite color to me? As detailed as possible
    a. Tell me about the time when you learned this was your favorite color.
    b. How would you describe a sound that represents your color?
    c. If your favorite color was a song, which song would it be?
9. What are elements of color and light that stand out to you? Shade, warmth, brightness? How would you relate them to your understanding of sound?

Introduce our ideas at this point:
Creating Colors using sound: a soundboard where you mix different sounds you like to create a tune that embodies a color. - a tool for color conception
Creating sound using colors: choose, adjust, and mix colors to produce sound - a tool for composition

10. Would you consider using either of these tools? Which is your favorite?
11. Any ideas on how we can improve this tool?

Interview Insights Synthesis:

After interviewing five people with varying levels of knowledge in music and color theory, we found that both beginners and experts prefer straightforward platforms that don't involve multiple steps when learning a new system. Since our project focuses on music composition, we asked our interviewees about GarageBand as a music-making tool. Our interviews suggest that Garageband is an example of a platform that is intuitive and user-friendly, in contrast to Ableton, which was deemed too complex even for some experts. Interviewees also gave us examples of similar music composition tools.

We aim to create a program with a low learning curve for both beginners and professionals. Additionally, when interviewing a person with synesthesia, we discovered a potential conflict: Assigning colors to sounds subjectively in our program could be problematic for individuals who naturally associate specific colors with certain sounds, as they would disagree with the color assignment. This leads us to believe that people who have synesthesia may not be our target audience. However, we also learned that people prefer using colors as a tool for music composition rather than using sounds to gain a deeper understanding of color theory.

Interview Nuggets:

- Similar tools like Muse:
    - Canopies
    - Ableton
    - GarageBand
    - Logic
    - Synthesia (Piano for Everyone)
- We should create something that has a lower learning curve for experts - having fewer steps, more straight-forward
- There may be a conflict for those who have synesthesia - they may disagree with the sounds we associate with each color and may be turned away
    - We can get inputs on what sets of sounds are generally associated with each color
- Idea: Or we can have people assign sounds to colors?
- Idea: Focusing the tool to help understand elements of sound such as treble, pitch, and bass
- Colors to sounds are more intuitive

Tool: Creating sounds using colors wins!

Design Goals:

With these nuggets in mind, we identified 3 design goals:

- Support amateur composers by limiting the number of components that go into the music
- Make interactions with the tool more intuitive by using skeuomorphism
    - Supporting intuitive relationships between sound and colors, such as brighter colors = higher pitch
        - Reference from Eshanya interview: “Would associate shades with volume, which seems more intuitive. Thinks about it as painting with watercolors, one stroke is a light shade- with every stroke it gets darker, an analogy for louder- like adding volume with every stroke. A darker shade then is a louder voice.”
- Support reflection-in-action by providing real-time auditory and visual feedback

Milestone 3: Task Analysis and Video Prototype

During this milestone we generated 2 personas who may interact with our tool to help understand the spaces in which our tool will be used most effectively. We then used these insights to form a task analysis diagram and video prototype.

Personas:

1. People who like music
2. People who want to produce music, but don't have a music background or technical skills
3. People who have knowledge of colors

Persona 1:

Background: Maya is a 35-year-old mother. She often listens to music on their way to work and she has a general interest in music. In her free time, she often attempts to create music using GarageBand, but she finds it too complex. Though she is interested in music production enough to make it her hobby, juggling life as a mother and her full-time job makes it challenging to sit down and learn music notes and composition.

Goals: She simply wants to create fun music as a hobby. She wants there to be a way where she can easily let her creativity flow in a very low-stakes environment. She found this app after another mom in a Facebook group raved about how an app helped her children pick up colors faster, using music. She thinks it would be a good way for her to create music, using color.

Persona 2:

Background: Isla is a 7-year-old just learning how to read and write in India. She is a student at a local elementary school and took a Punjabi music class for the first time. She was amazed at the cool sounds they made in class— how the bass of the dhol and the rhythm of the lyrics complemented each other. She wants to be able to create music, however, she has trouble understanding how to read the titles of each note, or how to write them down so she could play them.

Goals: She wants to be a professional DJ when she grows up, but is frustrated that making pretty sounds and remembering how to make them isn't as easy as she thought. Her teacher taught her what different colors mean and she finds combining them and playing around with them fascinating. Her teacher sees her struggling with music and introduces her to our app.

User Goal:

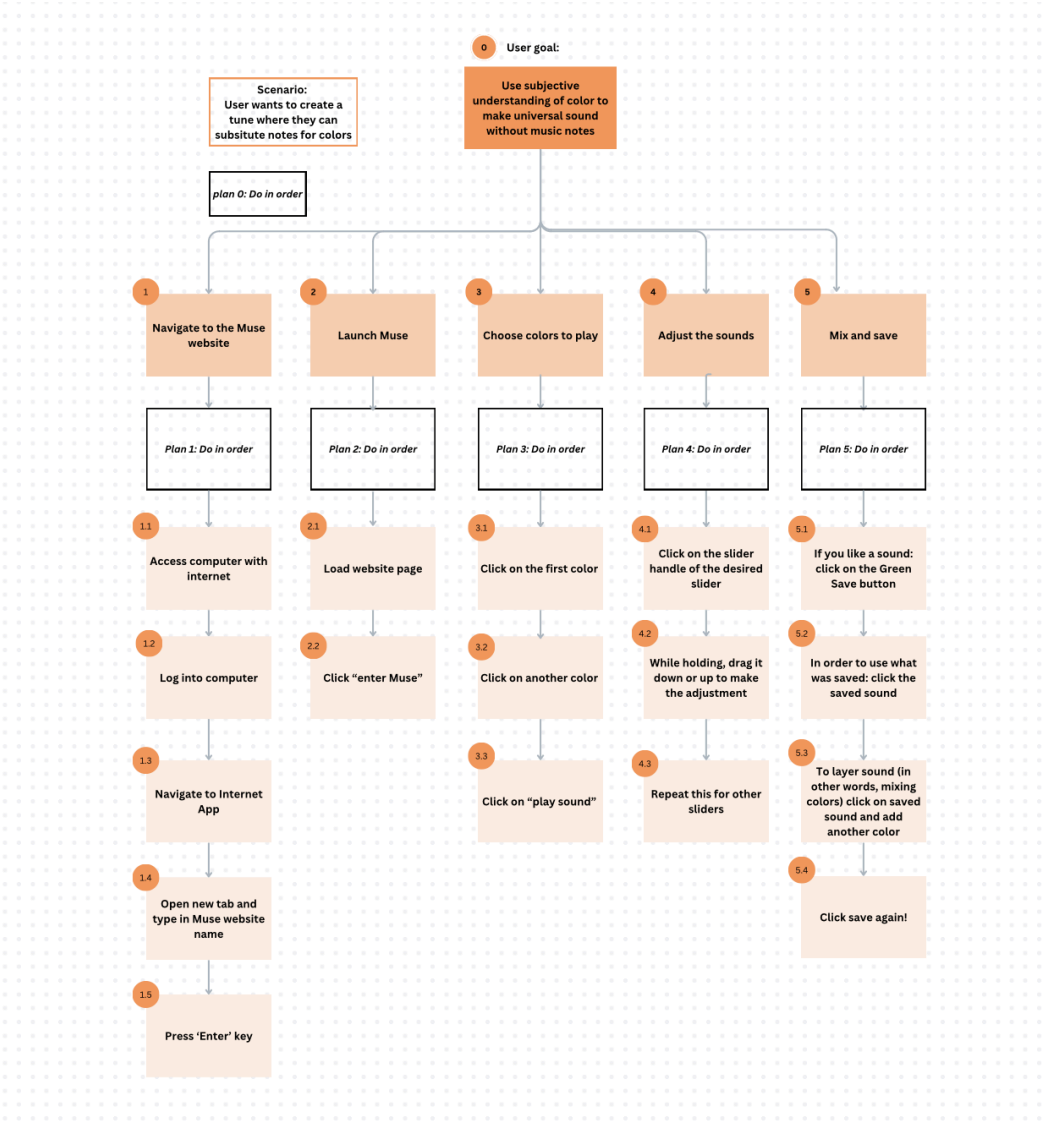
Use subjective understanding of color to make universal sound without music notes

Task Analysis:

System Components:

- Color pallet with color
- Click one a sound plays
- Click two - given an option to mix, layer, overlay
- Click three - option to mix, layer, overlay
- Play button
- Volume button
- Record button
- Download button (so we don't have to build a backend to save things)
- Undo system - click again to undo

Hierarchical Task Analysis Diagram:



Video Prototype:

How to use our tool:

- At the bottom of the DJ board, there will be a color palette that associates a color with a sound.
- When you click the sound, the color visualizes on one of the wheels and the sound plays indefinitely. When you unclick it, the sound stops.
- Click two colors, the two colors will visualize on both wheels. Buttons saying "mix, layer, or overlay" will pop up

https://drive.google.com/file/d/1laG_BWt2TydOpI-x0XUCFR_WKo5JrzF_/view?usp=sharing

Reflection Paragraph:

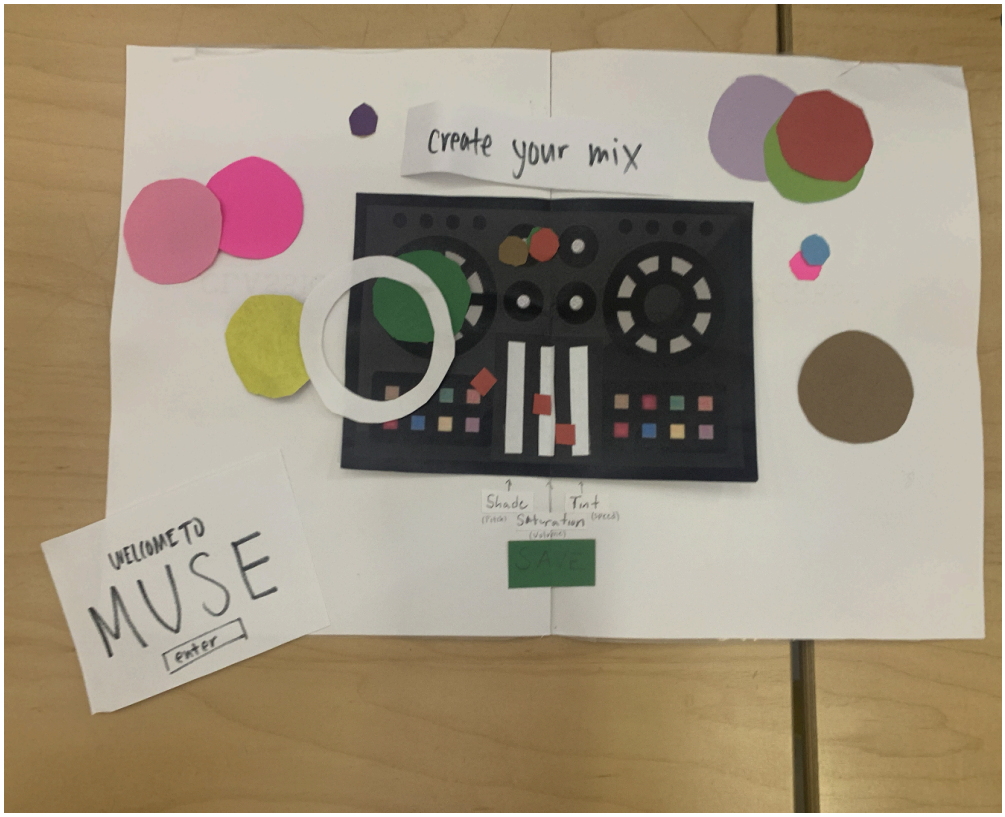
This group assignment took us 6 hours. The video prototype felt the most conductive because the activity really helped us visualize our project and understand its limits. Designing the user goal and understanding elements of the DJ mix board was the most challenging. The workload is labor intensive but fun. We are struggling with finding common times multiple times a week but everyone is contributing and being heard while creating the tool collectively.

Low Fidelity Prototype:

We found a DJ board asset on Canva and printed it to be our background. During the prototype, testers were guided to “press” one of the colored squares under the disk areas. We would then place a color circle that matched this color on the disk area and simulate what the color would sound like with our voices. We used the white circle border to signify which disk users were editing. Once testers clicked the green “save mixture” button, we would place the mix of the two selected colors on one of the smaller disks in the center.

In this iteration we had one set of sliders controlling both disk colors. Testers would move the red squares along the white tracks to mimic slider behavior. If the tester increased the tint slider, which controlled speed, we would change the color disk to a lighter color, and sing louder. We included labels below to aid testers to understand which slider impacted what effect.

See the image below for our prototype:



Evaluating Our Tool:

We identified notes on how we want to measure responses to our tool.

Mix of qualitative and quantitative:
Likert scale + interview, also liking the think aloud

1. Think aloud - ask them to verbalize their thoughts while they use the tool
    a. Ask follow up about their experience “I saw that you had a bit of trouble here, can you tell me a bit more about that?”

2. The likert - after using the tool, give them a likert scale survey to get a quantitative measure of their experience

3. The interview - ask them about their overall experience with the tool to get a qualitative measure of their experience

Milestone 4: Introduction Draft

Deniz complied, edited, and submitted our individual written components below.

1. **[Kaitlynn] Context:** Music production and color theory - returning music composition to the people – steering away from AI music platforms , giving power to the user

Music production has become more accessible in recent years. Beginner to professional musicians no longer need ties to a record label, recording studio, or even physical instruments to create music people enjoy. Software like Garageband allow the common person to overlay sound snippets into songs. People can then distribute these songs on public access websites like Youtube and Spotify to be shared with those around the world. This has allowed the average person to reclaim agency over the creation and distribution of their music. However, there are those who desire to create music without even the tools previously mentioned. Using AI, users can generate their own music on AI music platforms, almost instantly. Our project desires to steer people away from these platforms in order to give back the power the user is desperately searching for - the power to create music in an enjoyable, quick, and intuitive way.

2. **[Eshanya] The problem:** It is hard to conceptualize sound (music making is hard because people may have sounds they have in their mind, but don't know how to translate it into professional music-making tools)

Many people have an intuitive knowledge of rhythm and sounds, but translating the ideas of music into real sound can often be inaccessible. Casual creators who want to play around with melodies often find it difficult with limited applications for beginner-friendly music creation. The process of merging and mixing different components and instruments with limited knowledge can also be overwhelming. If we found a way to connect people's already existing understandings of the world with the knowledge of sound, it would not only make music creation more accessible and instinctive, but also make the process of music creation fun.

3. **[Deniz] The bit:** large learning curves for people who are new to the field. Intimidating and cultivating an exclusive learning environment, assigning sounds to colors will be hard

The music production tools available right now have very steep learning curves. Garageband was mentioned in our needfinding interviews as being very inaccessible. Tools like GarageBand are too intimidating for beginners and are tailored for professionals. They use jargon and cultivate an exclusive learning environment. For people with limited experience, it is very hard to get into music making and usually, they don't even attempt or get discouraged too soon. Also, there are people who want to make music and are interested but they don't want to do it

professionally so they don't want to use professional software thinking it's too hard. It is also challenging to conceptualize sound.

4. **[Zariah]Bit flip:** it should be more accessible and inclusive. Professional music makers should not solely benefit from these open-source platforms.

5. **[Zariah] Solution:** by using primary colors – something that most people are familiar with, we provide a gamified music production experience. Creative because users can interact with music physically. Returning the concept of elementary color association and applying it to music– rather than just visual art.

Bit Flip:
Music learning and composition should be about experimentation. The current platforms that support music composition are ones that require some sort of base knowledge in order to make an idea come to life. This fact is one that discourages many from experimenting with art, in fear that what they may create will be bad. We imagine that the antithesis to such an environment would be one that meets the user where they are in terms of experience level. Professional music makers should not only be the ones who can make satisfactory art with these open-source platforms. As music is a universal language, it should be communicated in ways that many people can understand.

Solution:
This leads us to wonder: What if we can communicate music using color? Inspired by the superpower of synesthesia, where some individuals can see music, we aim to create a tool that turns colors into sound. By using primary colors – something that most people are familiar with, we aim to provide an inclusive, gamified music production experience. In elementary schools, this practice of associating materials with a color or sound is used frequently. We aim to return to the concept of elementary color association and apply it to music– rather than just visual art. We hope that this creative tool allows users to physically interact with music.

6. **[Eshanya] Evaluating the Solution:** we will prove this by getting user feedback using The Think Aloud protocol and a Likert scale survey.

To evaluate the solution and our beta product, we will use a mixture of two tools that provide us with a deep qualitative and quantitative user feedback. Sitting with users and making them use the think aloud protocol (similar to the paper prototype video) will help us understand the design flaws, what is intuitive and what users are struggling with within the tool. It will also give us an initial understanding of engagement and reactions to the tool. We will also add a Likert scale feedback form at the end of the user experience. This detailed feedback will help inform design modifications and also help us understand if users relate with our color to sound allocations.

The likert scale being a simple 1-10 answer will also ensure more users take the feedback form and it is not needlessly time consuming for evaluators.

Milestone 5: Wizard of Oz Prototype

Each group member worked asynchronously to complete their assigned pages in the Wizard of Oz prototype. Zariah completed the Main Page, Eshanya completed the Muse logo and slogan, Deniz completed the Help Page, and Kaitlynn completed the Saved Colors Page. Each of these took a different amount of time since they had different requirements. Kaitlynn believes the Saved Colors Page took about 2-3 hours to complete.

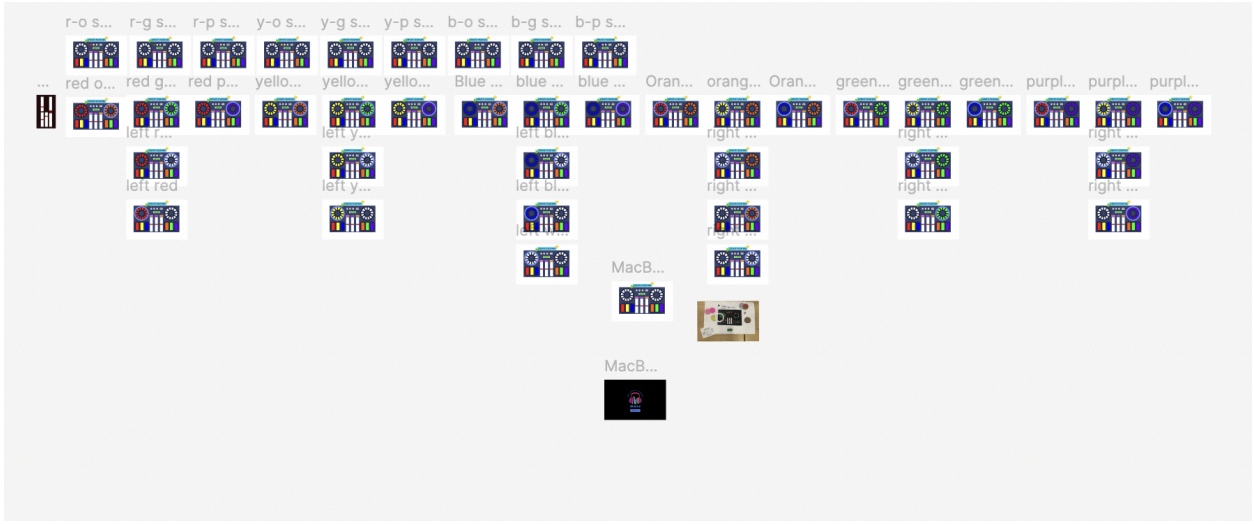
Figma Prototype:

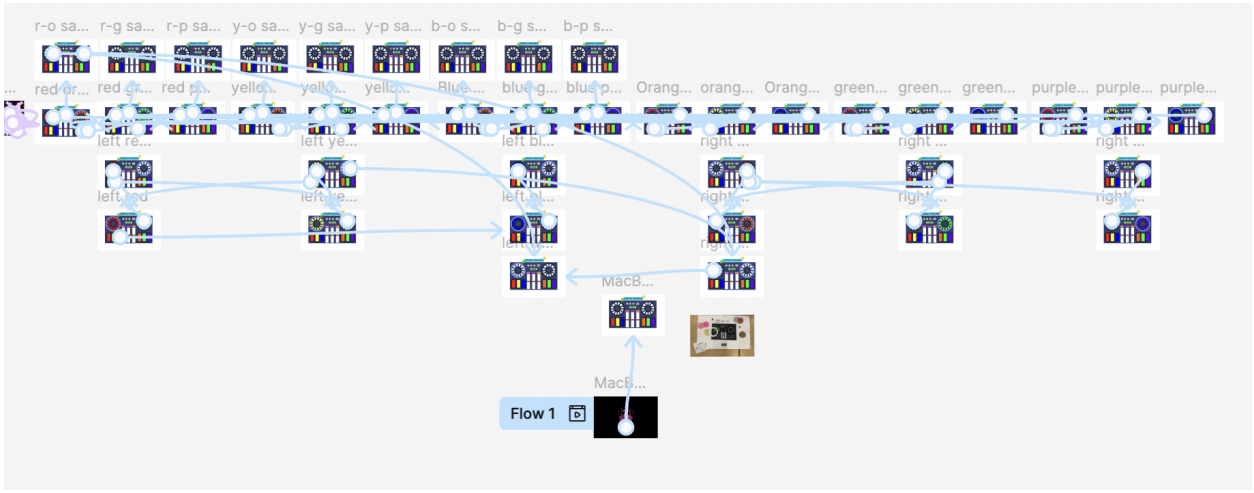
Figma Link

https://www.figma.com/design/RWuiQRzmbK9dwoKFc1hr6I/Actual-Muse-Wizard-of-OZ?node-id=0-1&node-type=canvas&t=mNwub65kgLRkgbuO-0

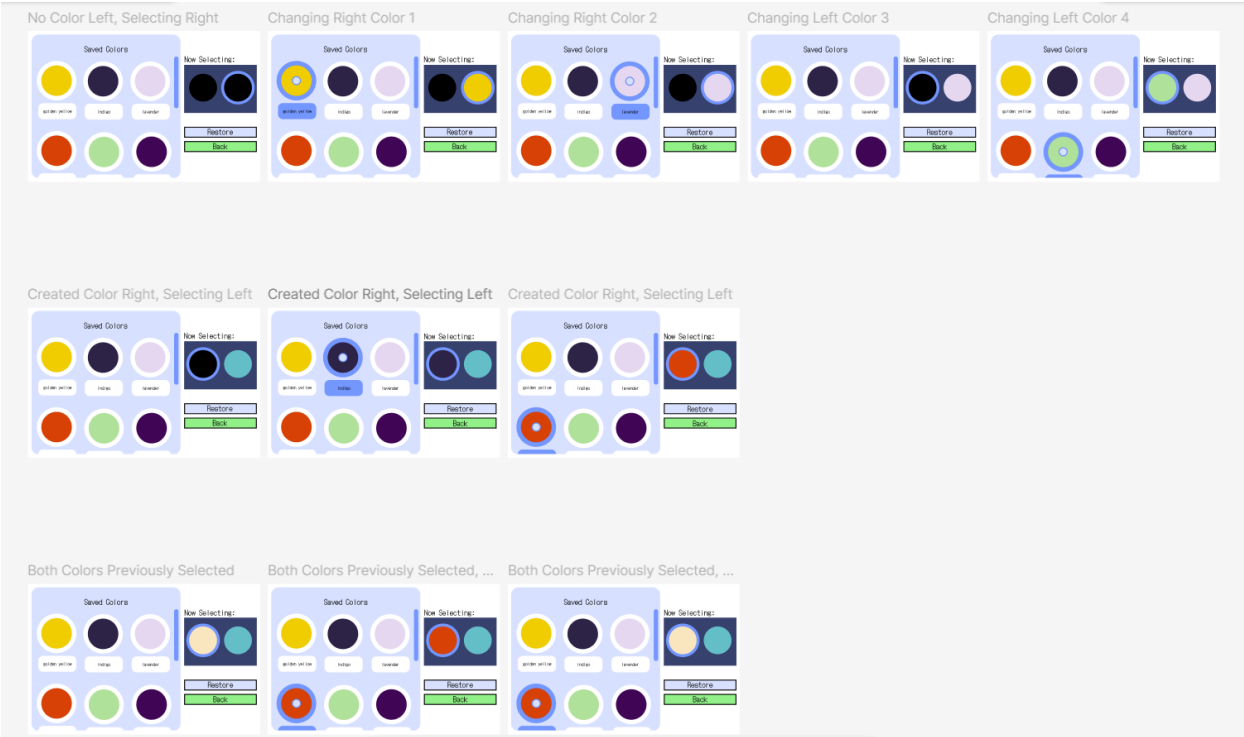
Welcome Page

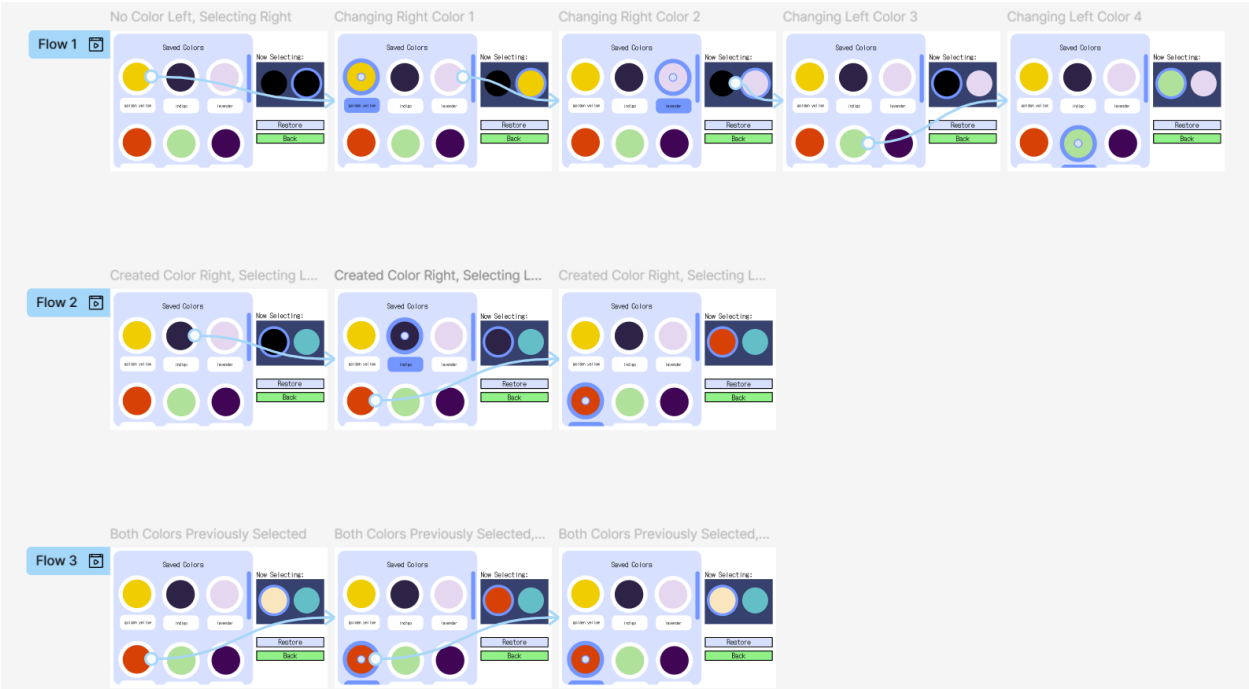
Mixing Colors + With Flow



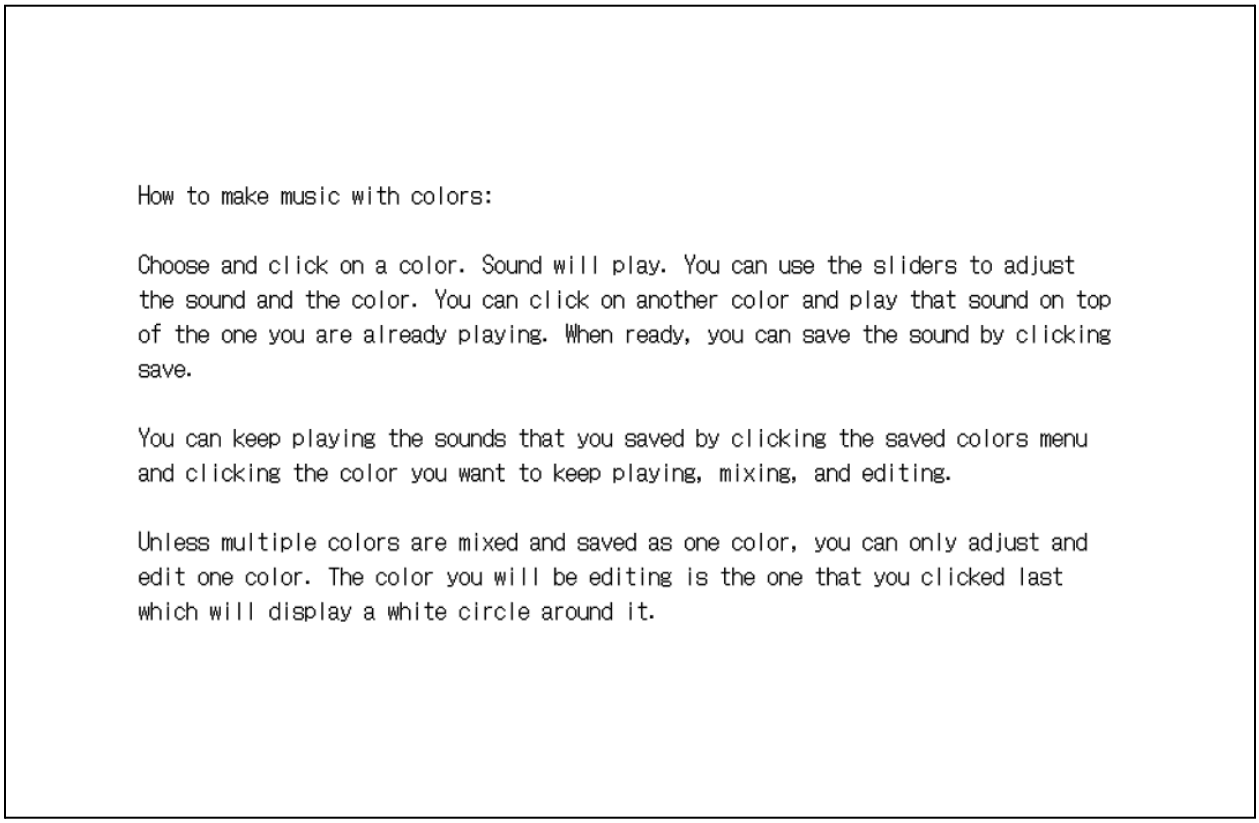


Saved Colors + With Flow





Help Page



First Round of Evaluations:

Based on watching users use tool without guidance:

- The selection tool is kinda counter intuitive
- Suggestion: Make the selection tool pop up by default at first
- Make colors work for both wheels instead of one side
- Make the selection tool white- with it being a color it can be confusing (bonus points for animation)

Recommendations:

- Everyone talked about a tutorial at the beginning going through the app
- Like the idea of letting users assign sounds to colors
- If we click on the saved color, it should show different components of the color
- Import button for music??
- Key for colors
- A quick walkthrough of what the sliders do in terms of sound
- Label the saves - so like a save naming feature before it gets saved

User comments:

- Fun + buttons are clear on what they do
- Like the color mixing thing
- Recommend- in the beginning you should have a tutorial - a next next next button
- Pointing arrows to those things
- Consider separating the use of colours for the things they can change and what is done by the system, the selector should be white
- A key for which colour makes what
- If we click on the saved colours- they should show their separate components
- Import button for their own music
- Wanted to add to the key of sounds
- The selector people think is a color of its own- should make it white
- Saved colors could be labelled- why did I make this
- Labels should have a quick walkthrough so people know

Professor Feedback:

Main Feedback: We need to figure out what sounds are we implementing

- Thought the ring around it was an active color
    - We should be able to just click a color below to have the color change rather than having to click each disk and changing it
- Should we just have separate sliders for each disk
- More saved colors can show up as a pop-up
- Soundboard change
- Follow paint logic rather than light
- Look at DJ mixing boards already made, use their implementation and UI to guide

Recommends Looking into the Following:

- Chords
- “Hertz frequency sounds”
- Piano key notes - b sharp etc etc
- Taking snippets from royalty free songs - more likely to sound bad

Recommends Researching the Following:

- Dj asset websites - generate the sounds
- Instrumentation - chords to colors

Reflection:

The workload of the class is matching expectations, and more time may have been spent on this assignment as we needed to gain familiarity with Figma. The workload is being distributed fairly - each person has stepped up to take on key roles at different times. For example, Zariah took on the Main Page for Milestone 5, while Deniz took on compiling and uploading our paragraphs to overleaf and submitting for Milestone 4. Eshanya guided users throughout our first Wireframing demo, and Kaitlynn compiled and organized the Milestone 2 interview notes. The general group dynamic is fun and functional, we make sure to let each other know if we can make meetings, and are open to being flexible about meeting times / locations.

Milestone 6: State Diagram

Step 0: Iteration

1: Selection tool counter intuitively

- Create an animated white selection wheel
- Have the first color be selected when pop up
- More dynamic click when playing a saved color

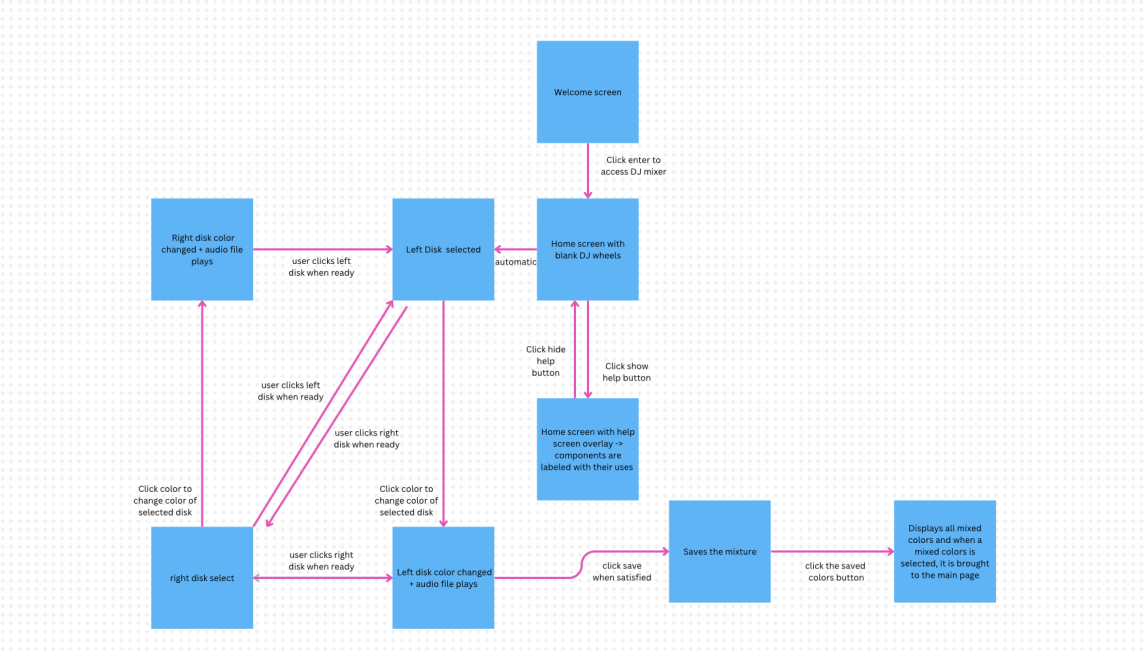
2. Help page/tutorial recommended

- Can be accessed by a help button, has an overlay to add labels to each of the elements
    - Labels can be toggled on or off
    - Can have a guided order of labels to guide users how to select, alter, and save colors

3.Improve colors and saving methods to make them more intuitive for users

- To be able to add colors (for later)
- If we click on the saved color, it should show different components of the color
    - Label the saves - so like a save naming feature before it gets saved
    - Naming with: https://www.thecolorapi.com/

Step 1: State Diagram



Step 2: Libraries and docustrings

https://github.com/DenizBajin/MUSE : look here (Note, was told in class we did not have to finish this step)

We will use a dictionary structure to give the user the ability to assign audio to colors if they don't like the default assignments. The dictionary will store their color - audio combinations.

Functions (so far):

```
// Redirect to the main mixer page when the button is clicked
   function startMixer()

// Function to load saved colors dynamically into the container
   function loadSavedColors()

// Function to update the color of the circle based on HSL values
   function updateCircleColor(circleId, hsl)

// Stops playing audio
   function stopAllAudio(){}
```

```
// Converts color from HSL to RGB
   function hslToRgb(){}

// Keeps track of slider values when interacted with
   function updateSliders(){}
```

Step 3: Timeline

Task	Person	Due date
Create github repo	Deniz	Nov 5
Write rough draft code with very basic functionality	Deniz	Nov 6
Make sure everyone has the code and can run it	everyone	Nov 11
Mixing colors functionality	Eshanya	Nov 11
Selection circle functionality	Zariah	Nov 15
Mixed colors page UI	Kaitlynn	Nov 23
Adding the logo	Eshanya	Nov 15
Making the audio play at the same time	Deniz	Nov 20
Adding the save mixture functionality	Eshanya	Nov 18
Adding volume, speed, and pitch functionality to the sliders	Zariah	Nov 25
Tutorial overlay (may just opt for a more detailed help page)	Zariah	Nov 25
Visual aesthetics - make sure everything fits on page <- I have this done for the full	Kaitlynn	Nov 23

screen size, but not for screens smaller than ½ page		
Adding audio-color manual matching feature	Eshanya - letting users assign colors to sound itself	Nov 25

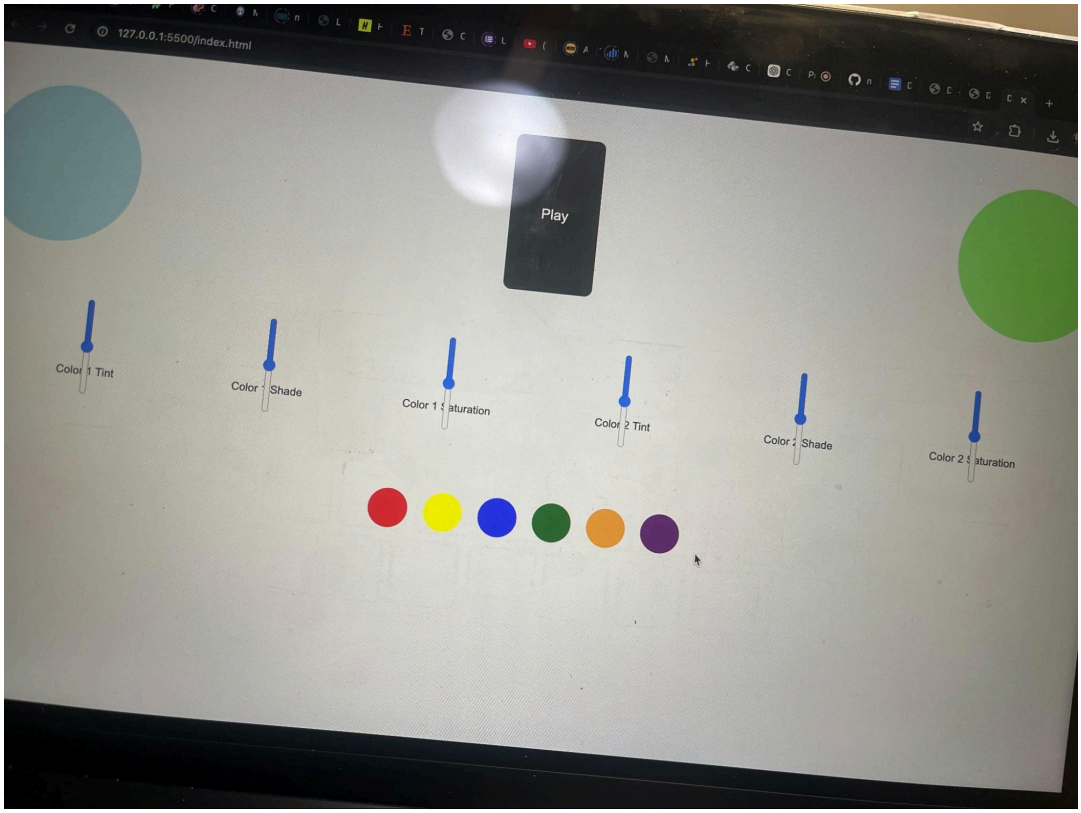
Step 4: Github and minimum functionality

GitHub:

Our **repository** for this project is located here:
https://github.com/DenizBajin/MUSE

Minimum Functionality Demo:

Design Snapshot Screen recording of minimum functionality is located here:
https://drive.google.com/file/d/1FEFbEjOuOy4zfBD959mA_JURzaLqS84V/view?usp=sharing



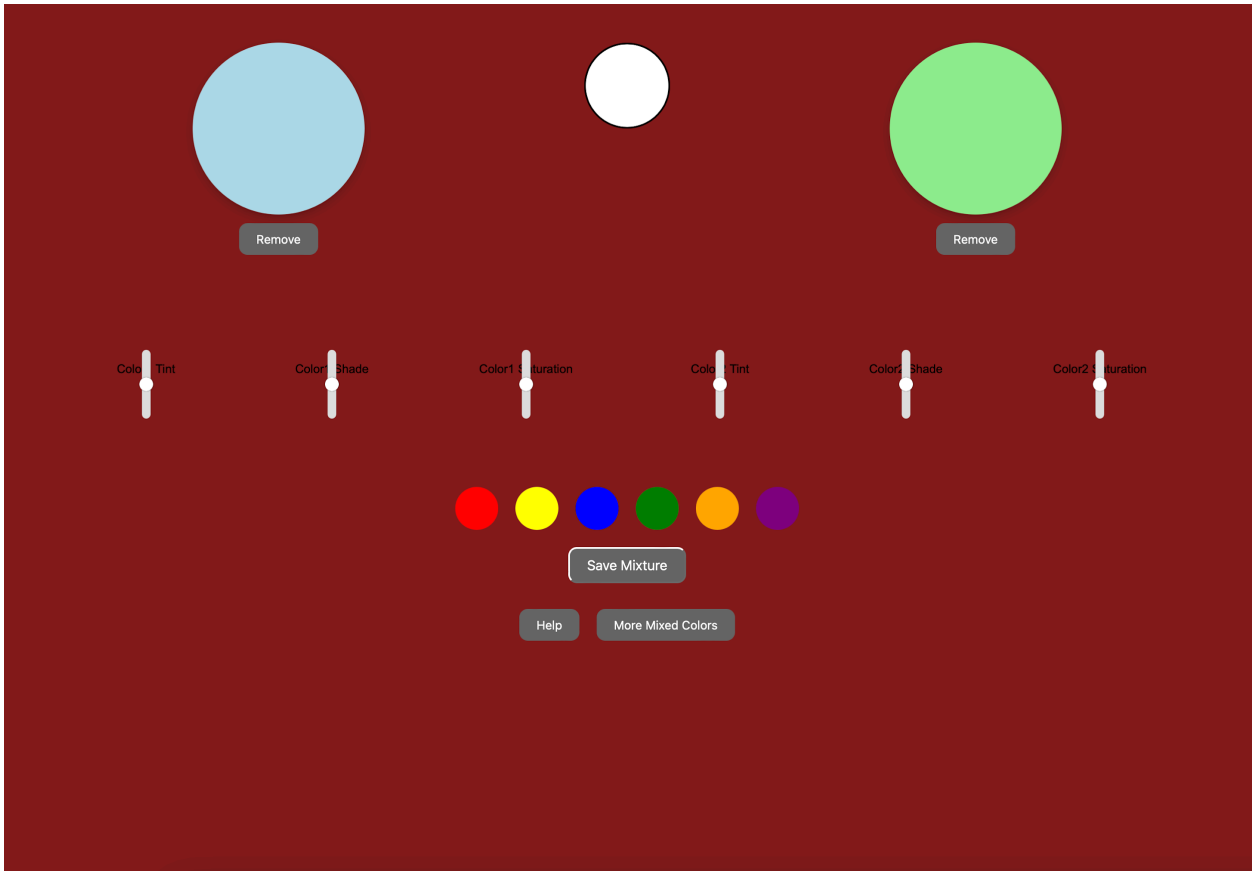
Picture of our minimal implemented functionality

UI Updates

We updated our UI to make the sliders look more like DJ sliders and begin moving all content to be visible on the page. This would allow users to see all options at once, rather than accidentally missing a button and feeling stuck.

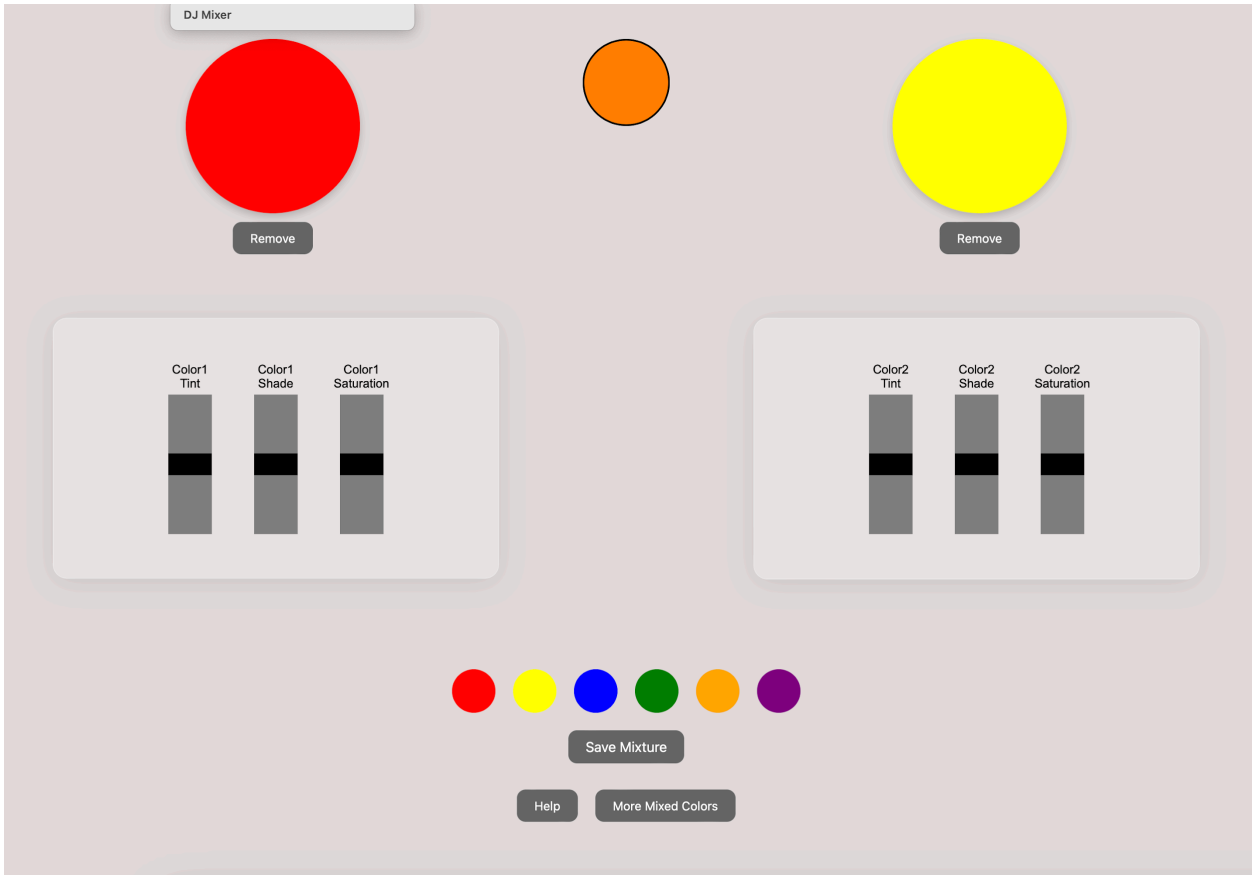
Experimenting with background color:

We eventually opted to go for a more neutral color to focus attention on the color disks.



Content layout:

Ensuring all content fits on the same page. See also updates to the sliders - we grouped them into their own boxes under each disk to make it clear which sliders controlled which disk.



Limitations

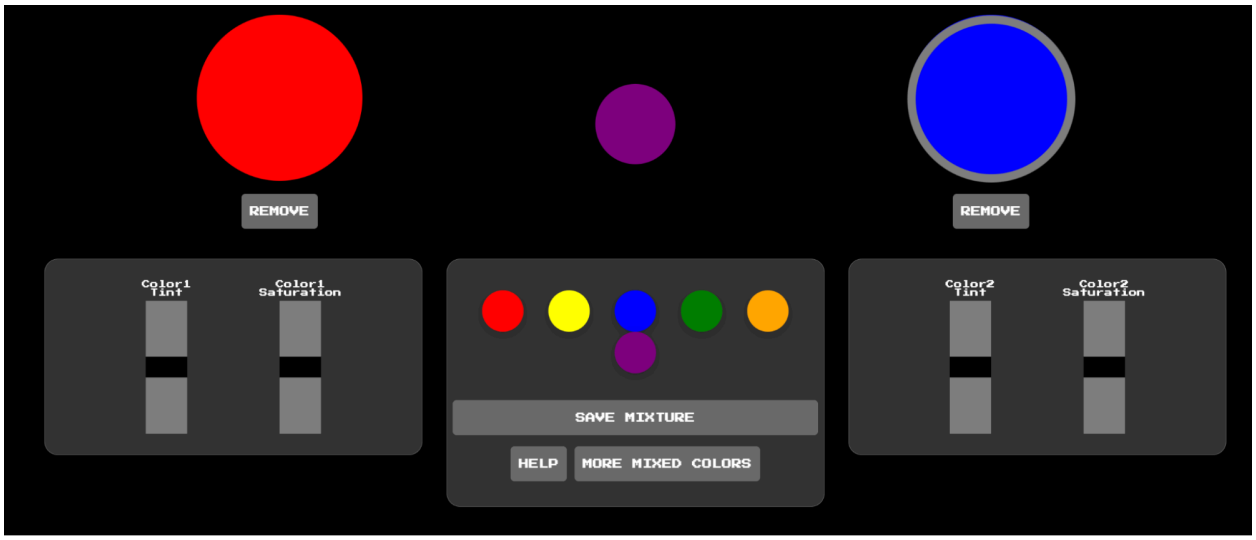
[Sourced from Final Paper]

The final implementation of Muse looks slightly different than what we expected. Our original goal was to have sliders that manipulated speed, pitch and volume of a sound. However, the audio API that we used to build the program did not support the pitch-shifting feature, so we were unable to get a third set of sliders working using the API we had. In order to minimize the risk of having to restart, we decided to only lower the number of sliders. Another goal we set was the ability to mix more sounds using saved colors, and having the users implement their own colors. Due to timing, we were unable to implement these features. Finally, we wanted users to be able to access their saved sound along with their saved color which is a function we are still trying to implement.

In the future, we want to implement the things that were in our original ideation stages, like the adding colors and to compose with the mixed color features. We also want to do more research and focus more on accessibility. Passionate about creating music with color, we want to add features that would support those who are colorblind

Evaluation

MVP Evaluation:



Notes from Eshanya and Zariah:

The selector is not intuitive- we need to have a selector already on the left one
They think the sound is very cool

Switch color- the color mixing is not very intuitive
Suggestion: a real dj board, add buttons, things that can happen

Music choice
All lo-fi - copying that guys video thing would be cool

Shade
Echo, Reverb, Pitch,

Different colors, dif instruments

Recording feature - record your own voice to add onto the beat
Toggle: what icons each of these instruments are

When the app pulls up it should start with white colors not mixed

The mixed colors are not right right now
The new UI- the more mixed color

Notes from Deniz and Kaitlynn:

Selection is working

Make sure the disks start white

- Right now they start red and yellow

Was unsure which slider controlled what, leaned in to hear the difference
If we turn down the volume of one color and and turn up the sound of another we should only hear one

- White does not have a sound associated with it so this is what caused confusion

Update UI so that all the components are visible on the main screen

- Put all elements in a div and make the div the same size of the screen

Some colors don't have the much difference or overwhelm the sound of the colors

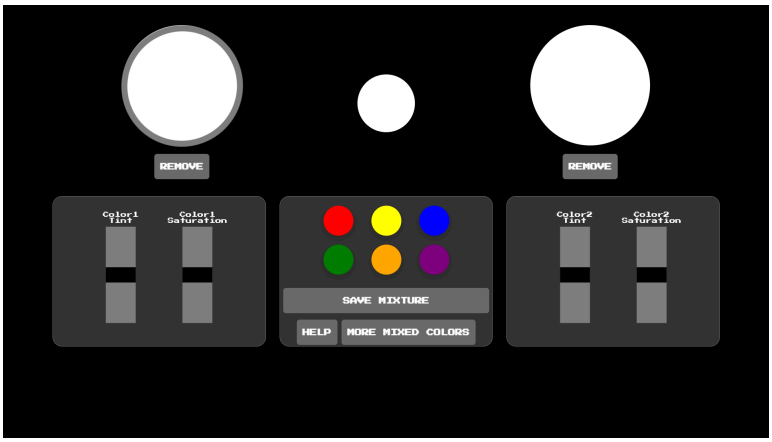
We need to choose better soundsss

Reduce space around the sliders since it isn't being used
Ways to reduce the amount of pages we have
**** Have a horizontal scroll of the extra colors on the bottom of the page with all the extra colors

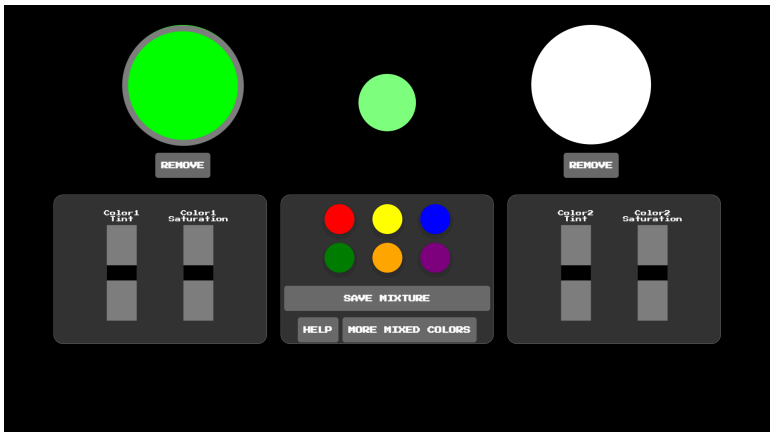
Can make the help screen as a pop-up overlay

Final Evaluation:

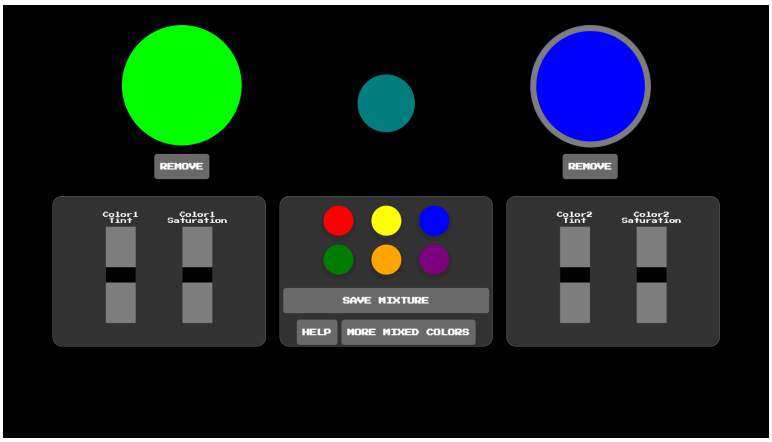
No Colors



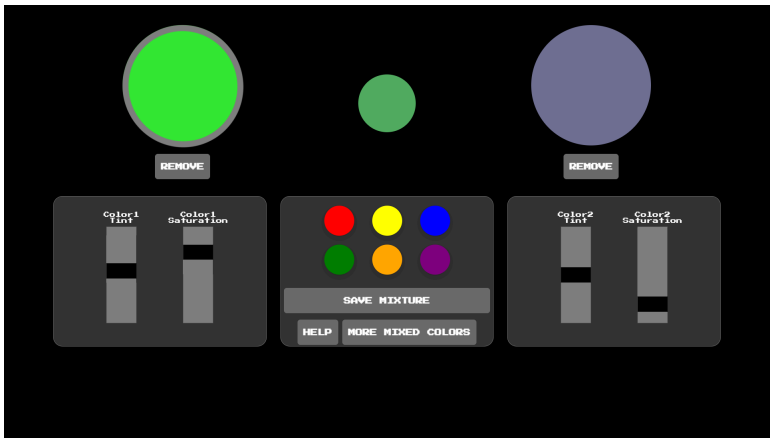
Adding Left Color



Adding Right Color



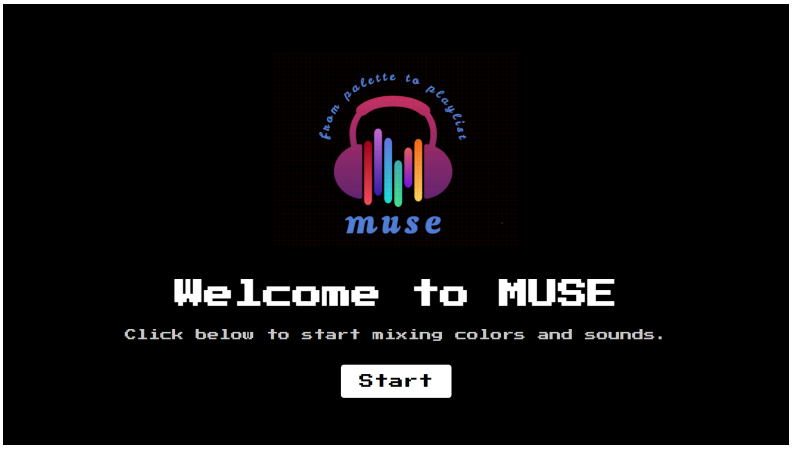
Editing Colors



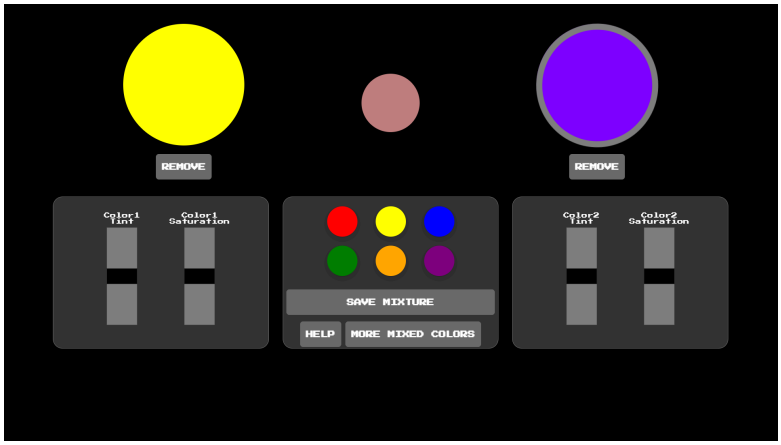
- Everything is super intuitive
- Mixing already mixed colors would be cool feature
- Adding more sliders (we can't do it)
- The first time we add a color it stops playing when another one is played only for red (bug to fix)
- Interface is cool
- Label that says this is your new product
- In help add info on what tint and saturation do
- Block the sliders from moving when a color is not selected
- We should crop sound of colors so that they immediately start playing with delay

Final Product: Muse

Welcome Screen

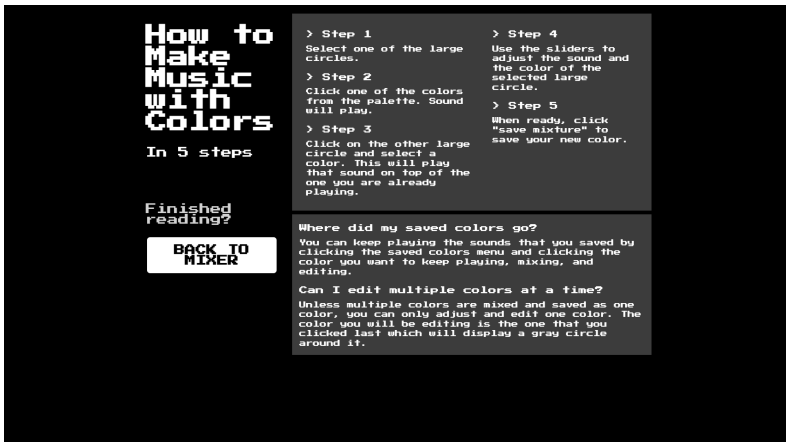


Mixing Colors Page



Saved Colors Page

Help Page



Video Presentation

Video

https://drive.google.com/file/d/1LKU8M2fM9egrh-V1C9D3rp_5v0pHDtXY/view?usp=sharing

Script

Motivation: Kaitlynn initially proposed Muse to be a tool to help distinguish colors from one another by associating unique sounds with each color. However, during our needfinding process, we realized that there is a need for beginner music producers to understand how different components of sound work together so that they can create music on their own. Thus, we shifted our project to instead focus on music comprehension through color mixing and shifting.

We intended to create an accessible music making program that would allow users to create music using colors, save them, and mix them to create complex music without prior knowledge of music composition. We purposefully created it in the style of a soundboard in order to mimic realistic music composition tools, and to create a smaller learning curve, as the appearance of a soundboard is familiar to many. We purposefully use color-theory terminology instead of music terminology in order to encourage exploration within our tool and to further hone-in on the idea of making music using color.

With that being said! Lets get on with the tutorial

Conclusion

[Sourced from Final Paper]

In conclusion, Muse is designed for beginner music producers who want to gain exposure and experience playing with different components of sound. Muse is a creativity tool that serves as a first stage in understanding how different components of sound impact the eventual music produced. In our needfinding interviews and research, we identified that an understanding of music theory, how different components of sound work - such as pitch and volume - , as well as knowledge of music production software, is required to produce quality sounds. Muse applies our users' understanding of color to this new realm of sound. Muse creates a bridge between a color's tint and saturation, and a sound's pitch and volume, respectively. In doing so, we provide users with a visual representation of how these components of sound impact the output. With the insight we gained from our prototyping sessions, we have designed an intuitive interface that resembles a DJ board to reduce the learning curve in engaging with our tool. Thus, we have removed the barrier of needing to learn new software to produce music. These features allow us to achieve our ultimate goal of providing users an interactive experience to gain a better understanding of different components of sound in an accessible environment. In our case, it is pitch and volume.

With Muse, the user builds their own relationship with sound and its association with colors. We found that users did enjoy this unique approach to sound creation and color association, and in

a further expansion of this project we would like to create the option for users to make their own color-sound associations before playing with mixing on the DJ booth.

Appendix

Interview Notes:

Our interview notes are split by the team member who conducted them. Each individual person's interview notes are below.

Deniz:

Interviewer: Deniz Bajin
Interviewee: Person #1
Location: Walker 726

Critical Points:

- Doesn't see a strong connection between colors and sounds
- Very different color sound associations than what we discussed as a group
- Many people don't create music

General Summary:

The interviewee did not see a strong correlation between music and colors and thought that drawing such connections would be difficult to articulate. However, he did see that in some cases, there could be aesthetic similarities between sounds and color. Since such connections might be difficult to draw direct, intuitive connections with, he thought that a tool that could generate music based on colors would be helpful for someone who wanted to create music based on a specific image or setting that the person had in mind.

1. How would you describe your learning style? Ex: visual, auditory, kinesthetic

Visual. Examples of certain concepts that he is trying to learn are being played out in practice.

2. Does gamification allow you to learn faster and easier?

Has limited experience with learning through games. Doesn't really work for him.

3. Have you heard of GarageBand?

Yes. it can be used to make music. Didn't use it seriously.

- How was the learning curve? Easy? Hard? What made it easy/hard?

4. How would you describe your relationship with music?

Loves music. Listens to music for several hours a day. He likes a lot of different genres: EDM, hip-hop, jazz, and pop. Usually listens while he's doing something else. (walking, reading, driving, sometimes studying, gym)

a. Have you tried to create music? If so, could you tell me about a time when you faced a barrier when creating music?

Mixing music, slowing down, speeding up etc. modifying existing music. Used iMovie, and played two songs on top of each other. Easy to learn. Used it a lot when he took a filmmaking class in high school. iMovie was not super intuitive and required lots of things to keep track of.

i. How would you describe this barrier?

Importing certain things to iMovie was tricky.

ii. Could you share with me some resources you hope to have when creating music?

GarageBand. Access to lots of music that has already been downloaded and made available. A place to store that stuff. Access to music (Apple Music subscription fee) and how to download stuff.

5. When you hear __, what color do you associate that sound with? (random tunes)
   a. https://open.spotify.com/playlist/1XdB7RNvmhFWBIgNkpjeVm?si=sMQxFKY1QV6gN2w_UhL9iQ

Brownish gray
White
Bluish-green
Black
Black

6. Do you associate shade with volume or pitch? Is a darker shade a deeper voice or a louder one?

Pitch. Deeper.

7. What are some elements of sound that stand out to you? Bass, treble, pitch? How would you relate them to your understanding of color?

Speed. Sharpness of notes. Fast is lighter colors.

8. Could you describe your favorite color to me? As detailed as possible

The night sky is dark blue, but a little bit brighter, full moon out so little more brightness. Deep color. Wide expansing very large.

a. Tell me about the time when you learned this was your favorite color.

Relatively recently. He associates it with coolness (colder, temperate, moderate).

b. How would you describe a sound that represents your color?

Daring, exciting, and slow but it feels like it's leading up to something more intense. Very electronic sound.

c. If your favorite color was a song, which song would it be?

Influx by Dream Shore

9. What are elements of color and light that stand out to you? Shade, warmth, brightness? How would you relate them to your understanding of sound?

Darkness, sharp color, is it a mixture or primary? Similar things stand out to him in terms of sound.

Introduce our ideas at this point:

Creating Colors using sound: a soundboard where you mix different sounds you like to create a tune that embodies a color. - a tool for color conception

Creating sound using colors: choose, adjust, and mix colors to produce sound - a tool for composition

10. Would you consider using either of these tools? Which is your favorite?

Yes. Color to sounds is his favorite. If he has an image or aesthetic in mind and he wants to think about what music would along with that he would use that kind of software. Creating colors is a little less useful.

11. Any ideas on how we can improve this tool?

He doesn't know before he sees the tool.

Deniz Interview Notes

Eshanya:

The interview was conducted by Eshanya Agrawal. She interviewed Person #2, a friend and senior at Pomona College. She is a professional photographer and has a good understanding of colors and lighting. The interview was conducted on the benches at Walker Beach.

Initial impressions:

- Our discussion on the app Canopies helped me conceptualize the tool and the element of competition and challenge in making the concept more engaging. The piano tiles always created different tones and beats and they all had corresponding colors. Made me think about how it would translate to the color mesh DJ set.
- Thought about how every color can mean different things to different people and be perceived based on their experiences of the color. I can see a generalization, for example, red as angry, and blue/purple hues as calm. For example, the song 'Warm and Orange' is dark green and magenta for Person #2. Something to think about.
- I agree with the second idea being more engaging. The visual of having a DJ set with color schemes on it gives people more freedom to use their own perceptions of color to create different beats to associate sound with. It can help people with hearing ailments or also just people who do not understand sound as well as they understand the color perception around us.

(For Art-related majors)
Ask about elements of color

- Individual colors are good but also mixing them together. Thinking of color schemes. Being aware of color vibes and being mindful of how they work in conjunction with each other. Blue and lavender are cool together. Or green and brown as earthy shades. A red in its midst would symbolize a note or tune out of place but in specific instances might mix well to showcase a confluence of music. Look at the color reel to ensure color tones and themes match tunes and vibes.
- Color wheel

Interview summary:

1. How would you describe your learning style? Ex: visual, auditory, kinesthetic
    - Visual is her learning style. Harder to grasp concepts if they are just talked about as opposed to graphs, figures, etc. Notes and drawing to ground concepts. Color-coded stuff helps her a lot. Simple diagrams with arrows. Visual cues that help explain systems. Power balances and imbalances. Being able to see for ex a pyramid hierarchy will give you the magnitude, proportions, quantities, and relationships.

2. Does gamification allow you to learn faster and easier?
    - Took a class called Game Design. using games for environmental education. Games have a lot of power in education and understanding. Appeals to the innate sense of competition. Get more invested. For ex- duolingo. Rewards are addictive. Easy and hard questions mix helps with an ebb and flow, to make the

player engaged. Want them to be challenged and rewarded. Great for education and makes it more fun.

3. Have you heard of GarageBand?
    - How was the learning curve? Easy? Hard? What made it easy/hard?
    - Used it a little bit in middle school. Pretty basic sound mixing. Pretty easy to use. Clear directions, accessible tools for sound mixing with easy design techniques.

4. How would you describe your relationship with music?
    - Pretty nice, listen to music all the time. Great way to manage your emotions. Happy or sad, a natural progression. Have you tried to create music? If so, could you tell me about a time when you faced a barrier when creating music?
        i. How would you describe this barrier?
        ii. Could you share with me some resources you hope to have when creating music?
            - Not as professionally affiliated/interested in sound as she is with color and visuals. Never tried to make music.

5. When you hear __, what color do you associate that sound with? (random tunes)
    a. https://open.spotify.com/playlist/1XdB7RNvmhFWBIgNkpjeVm?si=sMQxFKY1QV6gN2w_UhL9iQ
        i. Dead Cat's poem: orange and purple - jazzy was more purple; bright and happy made it orange
        ii. Warm and orange: dark green- cozy vibe; magenta: with the beats, adds a little twist, magenta is a special color for unique beats that surprise
        iii. Blueprints: Blue- sounds like rain at the start, very soothing
        iv. Landscape: light purple/lavender- very soothing, feels flowy, comfortable
        v. A match into the water: red, angry- hard beats

6. Do you associate shade with volume or pitch? Is a darker shade a deeper voice or a louder one?
    - Would associate shades with volume, which seems more intuitive. Thinks about it as painting with watercolors, one stroke is a light shade- with every stroke it gets darker, an analogy for louder- like adding volume with every stroke. A darker shade then is a louder voice.

7. What are some elements of sound that stand out to you? Bass, treble, pitch? How would you relate them to your understanding of color?
    - Treble stands out as sound as someone who does not know a lot about music. Can kinda tell if someone is singing well but treble helps explain why. Tone is like treble because the tone of a color gives the tone of a piece or vibe. A muted color is gloomy, and a bright color is happy. Treble also relates in similar ways in terms of guiding the piece.

8. Could you describe your favorite color to me? As detailed as possible

a. Tell me about the time when you learned this was your favorite color.
   - Turquoise. Reminds her of the ocean. Had a fair amount of toys and clothes that were turquoise. When I was 5, was asked in kindergarten, I chose it for the sounds and feels of the ocean and its life I grew up around the beaches in New Jersey.

b. How would you describe a sound that represents your color?
   - Chill but upbeat

c. If your favorite color was a song, which song would it be?
   - Moves by Suki Waterhouse, upbeat music with a house vibe

9. What are elements of color and light that stand out to you? Shade, warmth, brightness? How would you relate them to your understanding of sound?
   - Brightness stands out to her. Shade and warmth are important. Tones of different colors mixing in is about colors being in conversation with each other. Seeing colors in relation to each other. Brightness relates to bass for her.

Introduce our ideas at this point:

- ☐ Creating Colors using sound: a soundboard where you mix different sounds you like to create a tune that embodies a color. - a tool for color conception
- ☐ Creating sound using colors: choose, adjust, and mix colors to produce sound - a tool for composition

10. Would you consider using either of these tools? Which is your favorite?
    - She likes the second one more. She loves the combining of senses. Since she is a visual-oriented person, she prioritizes visuals over sound. She thinks the tool will give her a clear conception of sound. Our senses can become diluted all at once and this tool helps distinguish it. It reminds her of a music video where you can hear the music and see visuals relating to it. Also talked about the app canopies- colors as you go- playing piano on your phone

11. Any ideas on how we can improve this tool?
    - Really like it. Talk to someone who has synesthesia. Talking to people who have no relation to music or color. What's their way in? Interesting to see what lyrics would make it too complicated. A limitation for now is beats are a better way to represent sound.

Eshanya Interview Notes

Kaitlynn:

Interviewing Person #3, a senior Engineering major at Harvey Mudd College. Interview took place at Harvey Mudd's McGregor Computer Science Building. Identified having previous

experience in music in art through taking an Art and Design course in her sophomore and junior year of high school.

1. How would you describe your learning style? Ex: visual, auditory, kinesthetic
    - Relies on pattern recognition - prefers being exposed to a lot of material to absorb the concept.
        - Kind of a visual learner - this is more about the material absorption.

2. Does gamification allow you to learn faster and easier?
    - Yes, it's more fun! Not really exposed to it in later years. In high school there would be competitions in class - would get points for learning.

3. Have you heard of GarageBand?
    - No

3.5 How was the learning curve? Easy? Hard? What made it easy/hard?
    - Did not use GarageBand

4. How would you describe your relationship with music?
    - Loves music. Used to sing in acapella in high school. Wasn't her foundation in music, listened to music with family. Music has always been around - forgets how integral it is like culture, you have to put in the work to listen to specific types of genres

    a. Have you tried to create music? If so, could you tell me about a time where you faced a barrier when creating music?
        - Tried to turn poems into song

        i. How would you describe this barrier?
            - Can't read music - has an idea of how she wanted it to sounds but doesn't know how to replicate it, didn't want to go into researching how to create these sounds

        ii. Could you share with me some resources you hope to have when creating music?
            - Something to create the music notes
            - More knowledge on how these devices work, how the notes replicate in real life
                - Devices = instruments, electronic appliances
                - Idea: say a beat with your mouth and we take the tone and change it into how it would sound as a drum

5. When you hear __, what color do you associate that sound with? (random tunes)
    a. Dead Cat's Poem by Metropolitain Poets
        - Dark brown, guitar made it darker, deep dark brown, orange without the guitar
    b. Warm & orange by AUIIRA

- Red - sounds like a love song, feels like little bubbles of pink and purple in between but the background is red. The ka-chu ka-chu ka-chu is pink, the guitary bit is purple

c. Blueprints
- Green, natural color green, the color of a light green-yellow tree being hit by the sun, sounds like a good day out

d. Landscape
- Sounds so depressed - actually no, it started off sad, but now it's just blue. Deep blue.

e. A Match into Water
- Black and silver mostly because its emo

6. Do you associate shade with volume or pitch? Is a darker shade a deeper voice or a louder one?
- Volume - if anything its the reverse, the darker it is, the deeper pitch it has, the lighter the shade, the lighter the pitch. Darker color is louder

7. What are some elements of sound that stand out to you? Bass, treble, pitch? How would you relate them to your understanding of color?
- Bass - deeper bass = darker shade of color
  i. If you could control the bass, treble and pitch of a color, how do you expect it to change?
    - With red: Increase pitch = get lighter shade of color (lightest shade of pink)
    - With red: Increase base = richer shade of the color (maroon)
    - With volume is unsure
    - Treble - doesn't know what this is
      - [kaitlynn's note: maybe out tool can be something that helps with this]

8. Could you describe your favorite color to me? As detailed as possible
- Pink, brown, and green.
  - Pink = baby pink, like pink they have for barbie. Pink they use for gender reveals.
  - Brown = dark brown bark of a tree, a little lighter than a dark leather brown. Looks like earth and appreciates that. It is really common but we are so used to walking by it that we forget that this color is a normal thing we see everyday in most places.
  - Green = all shades of green except lime green

a. Tell me about the time when you learned this was your favorite color.
- For pink: always liked pink, everyone liked pink though so she lied that purple was her favorite color until reaccepting that her favorite color is pink (pick me era XD)
- For brown and green: likes to exhibit an earthy aesthetic even in professional environments. Feels like basics colors that we overlook

b. How would you describe a sound that represents your color?
   - First though it was hard,
     - for brown and green: trees rustling, the crushing of leaves, high winds
     - For pink: a high pitched something, has nothing for pink

c. If your favorite color was a song, which song would it be?
   - For green and brown: music artists: Erykah Badu, Orion Sun, Cleo Soul
   - For pink: music artists: PinkPantheress, Bruno Mars

9. What are elements of color and light that stand out to you? Shade, warmth, brightness? How would you relate them to your understanding of sound?
   - Likes warmer colors. Is unsure how to answer. Is drawn to its prominence everywhere like green and brown, drawn to things that go unnoticed. Pink is a fun little girly-pop era color.

Question 10 Background:
We have two ideas for our project:

Creating Colors using sound: a soundboard where you mix different sounds you like to create a tune that embodies a color. - basically, a tool to understand how colors work and relate to each other

Creating sound using colors: choose, adjust, and mix colors to produce sound - basically, a tool to create music with color

10. Would you consider using either of these tools? Which is your favorite?
    - Prefers the first, feels like that second is harder to implement since each person will have their own interpretation
      - For 2: the user will define the relationship between sound and color, which will be different for different people. Some people may not see increasing volume as increasing shade. May be difficult to implement
      - For 1: may be easier to implement since we the creators define the sound and then users can mix sounds to get different colors since they will know the association. Someone may not view increasing the elements of sound and their effect on the color the same way.

11. Any ideas on how we can improve this tool?
    - Would choose the first one. Attaching the colors to different instruments, different shades in different notes. Red of a drum mixing the blue from a guitar and seeing how that purple sounds like.

Kaitlynn Interview Notes

Zariah:

The person I interviewed:
Music Major
Person with synesthesia
Creates and composes music

1. How would you describe your learning style? Ex: visual, auditory, kinesthetic
- Visual
- Synthesia, is a program showing the notes on a keyboard . shows the notes and their their duration c

2. Does gamification allow you to learn faster and easier?
    - Does help. A tournament type game to learn languages.

3. Logic is a fancier version of garageband, but similar.
    - Super intuitive and super straight forward. Ableton stuff is shard. Logic is user friendly and straight forward.
    - Garageband and logic are equal. Logic is more powerful. Ableton was harder because of simple questions that were not as obvious on Ableton. All of these extra steps for Ableton for things that are one step for Logic. No tutorials needed for logic or garage band.

4. Music is so important to me. Composition is the main thing I do in life. Small-scale music studying. With synesthesia, i sometimes get into the sciencey and colorful route.
    - Usually very patient with self about composition. When facing writers block. Its easy when I know what to create. “I want to create this atmosphere” then i know i’m good to go. Everything goes into creating the field.” Hardest part is creating that environment.

5.
    - First one - no color
    - Second one - no color
    - Colors associated with musical characteristics
    - Beats and drums make song not really have a color
    - Classical and romantic music usually has a lot of color. Basic colors
    - Radiohead specifically has color. They get complex colors
    - Pyramid song by radiohead - super dark read
    - Cello suite no 1 song - yellow
    - Tchaikovsky: swan lake - medium dark blue.

6. Volume or pitch doesnt matter - but i have noooo idea what different shades of color does.

Shades might actually be different color categories.

7. Interesting Chord progession stands out first. Using a weird mode or scale . Things that are atypical.

8. Fav real world color is teal. have not found a teal color song - the number 8 is teal.
    - Love this mix of green and blue. Very soothing to the eye. I could cover everything with teal . harder to explain the colors besides soothing to the eye
    - One song called dream of sky. By Legus Battouski. - isn't teal but the closest thing to teal they could find in a song
9. I guess I like darker colors. In the rainbow. I like blue green and purple

10. Inconclusive. Kind of cant understand our topics, which means we should try harder to explain what we are trying to do. They said they probably wouldn't use anything that associates a specific piano key sound with a color, with fears that she would disagree with the sound association due to her already perceiving a sound as a color.

Zariah Interview Notes