



CS194H Spring 2022

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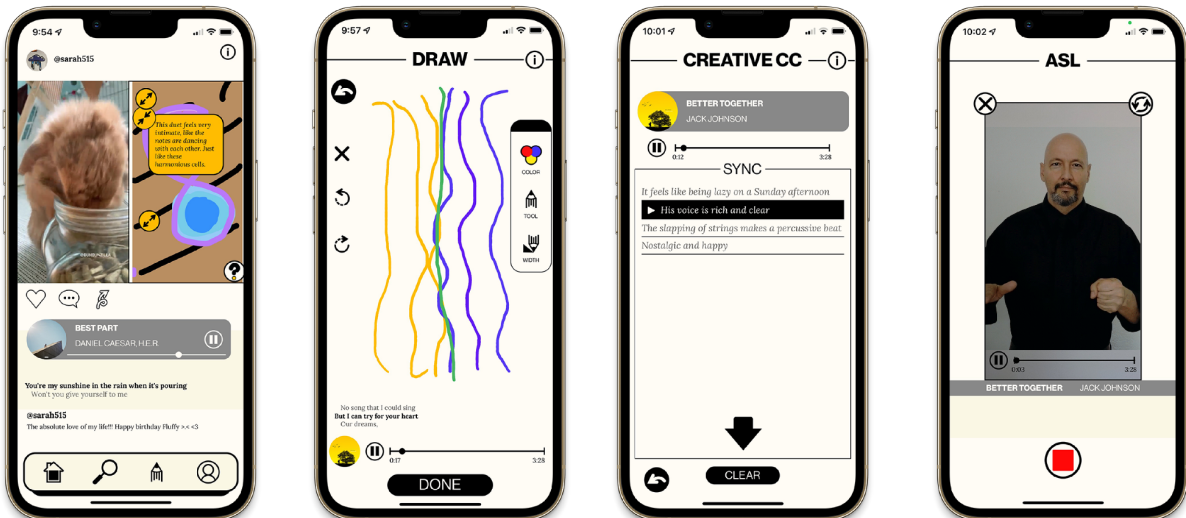
1. Problem Description

Our society is largely dependent on audio for communication and pop culture. As a result, these experiences are very often inaccessible for Deaf and hard of hearing people. Our goal is to make digital audio more accessible to the Deaf and hard of hearing communities.

2. Solution Overview

Reimagining audio for everyone

Deaf and hard of hearing individuals often miss the nuanced information and emotion presented by audio, and feel left out of spaces where they are unable to have the same experience as their hearing peers. ALTiO requires users to supplement posts with interpretations—whether that be drawings, ASL, or creative captions—that conveys these more nuanced ideas in a visual way. Users can explore various interpretations and profiles to discover and engage with the art and community found on the app.



3. Tasks

Task 1 (simple): Account Creation and Onboarding

The user creates an account and goes through the onboarding process to better understand what the app is doing.

It is important for users on ALTiO to be able to create accounts so that they can create content and engage with other creators while on the app—community is a huge part of what makes audio special and we want to translate that to visuals as much as possible. As a novel concept, it is also important for users to understand what the purpose of ALTiO is, and what they can expect to see in the app.

Task 2 (simple): See Altio

Users can engage with content by viewing posts made by other users on the app. This includes watching posted videos, scrolling through various attached interpretations, and interacting with posts via like and comment features.

We want users to be able to view content in their home feed and have the alternative interpretations support their viewing experience by setting the tone for the videos posted.

Task 3 (moderate): Create Altio

The user uploads a video to post with the choice to accompany it with an audio. Users then can add one or more of the following interpretations: drawing, ASL, and creative captioning.

Since we are building a social media platform, this is one of the most important tasks as it allows users to generate content to share with their followers and the greater ALTiO community—including more people in the audio dominated social media space.

Task 4 (complex): Explore Altio

The user explores different content in the search screen, including posts, audio, and other users.

Our solution is to include Deaf and hard of hearing people in consuming social media content with audio by providing them with audio interpretations. We want to let users feel free to explore different content in our app and find information to support their experience.

4. Task Flows

Task 1: Account Creation

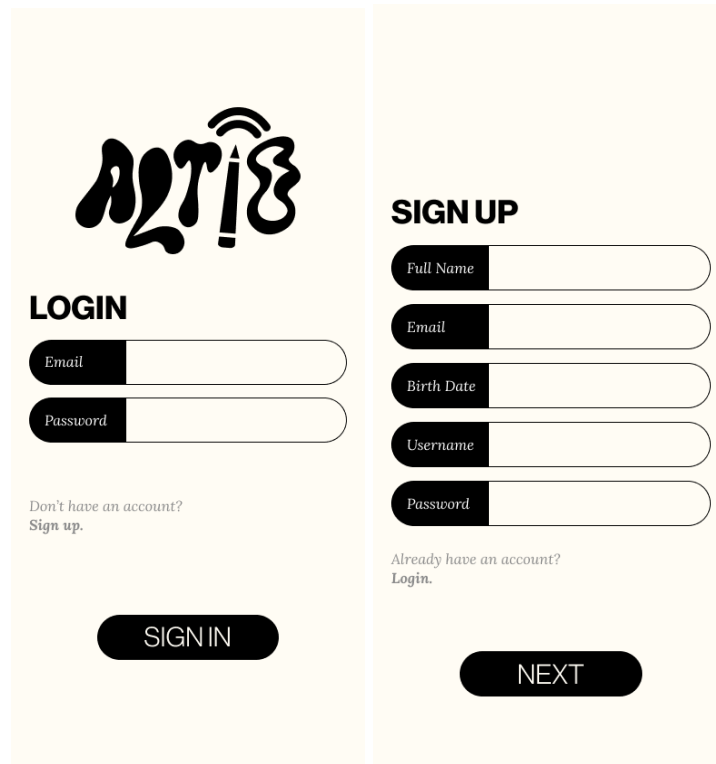


Figure 1: Login Screen and Sign Up Screen

Task 1: Onboarding

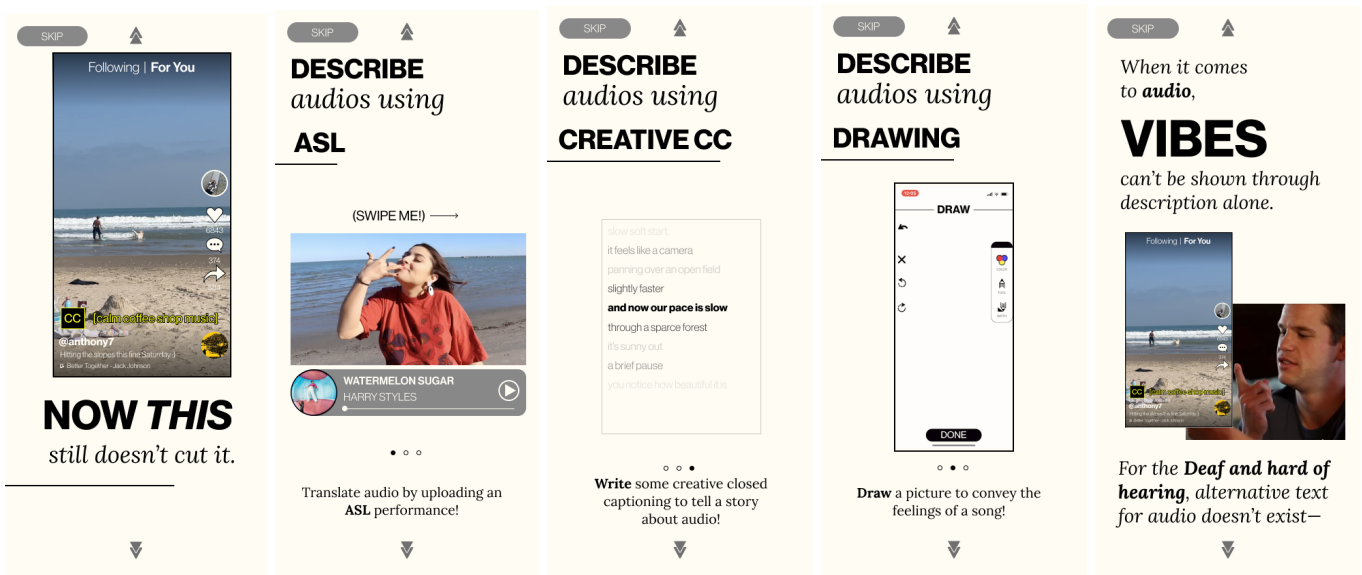


Figure 2: Onboarding Sequence Screens

Task 2: See Altio

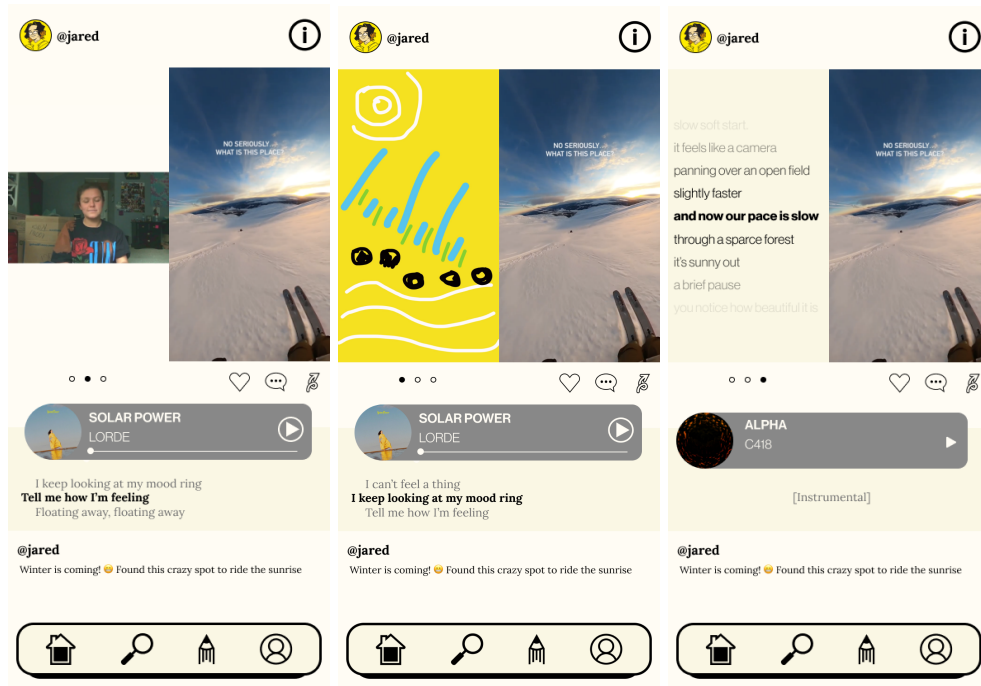


Figure 3: Home Feed (Interpretations) Screens

Task 3: Create Altio

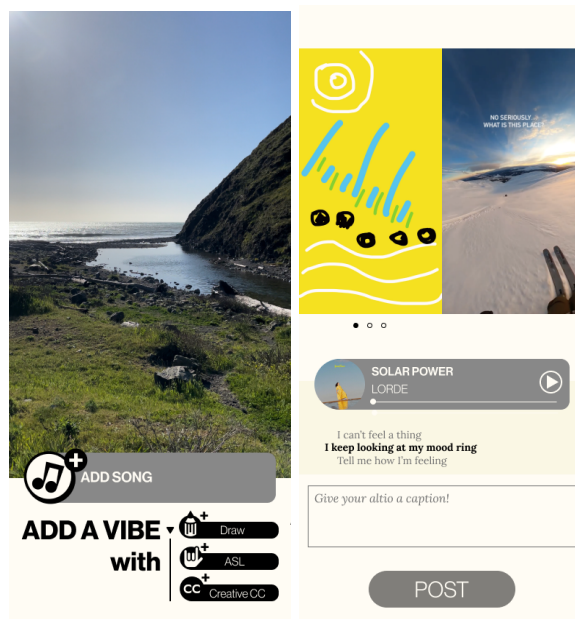


Figure 3: Choose Interpretation Screen and Post Confirmation Screen

Task 4: Explore Altio

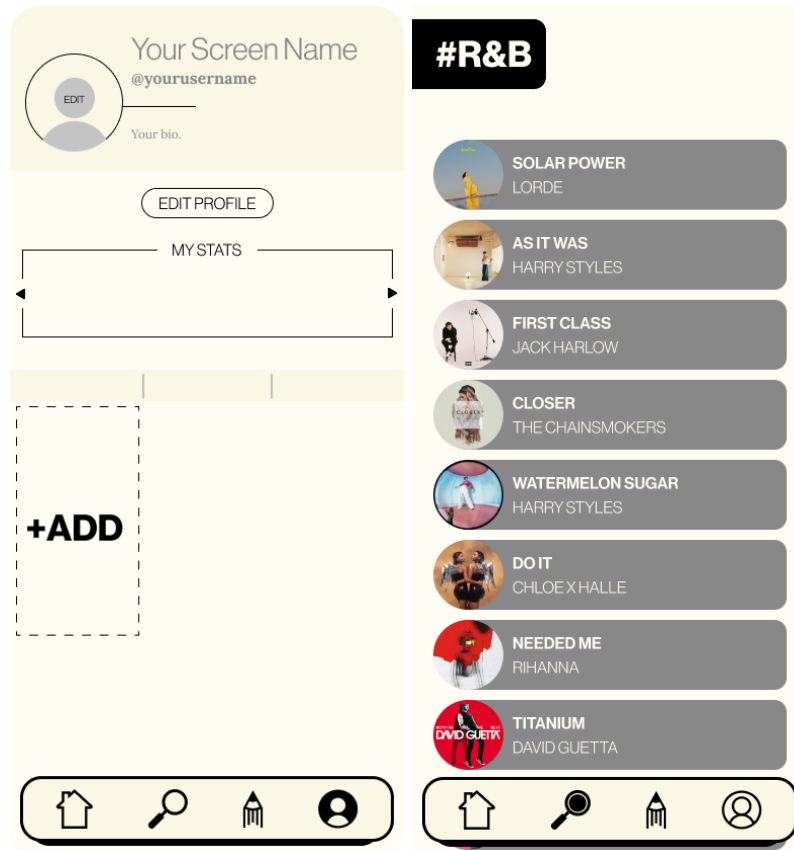


Figure 4: Blank Profile Screen and Search Screen

5. Design Evolution

Initial sketches

For low-fi prototypes, we started with sketches on paper to brainstorm possible user interfaces and screens for our solutions. Initially, we had two different ideas: an independent social media platform with drawing interpretations uploaded by users for each post (Figure 5)), and an audio recognition app/plug-in that would recognize audio from a microphone and display interpretations for it (Figure 6).

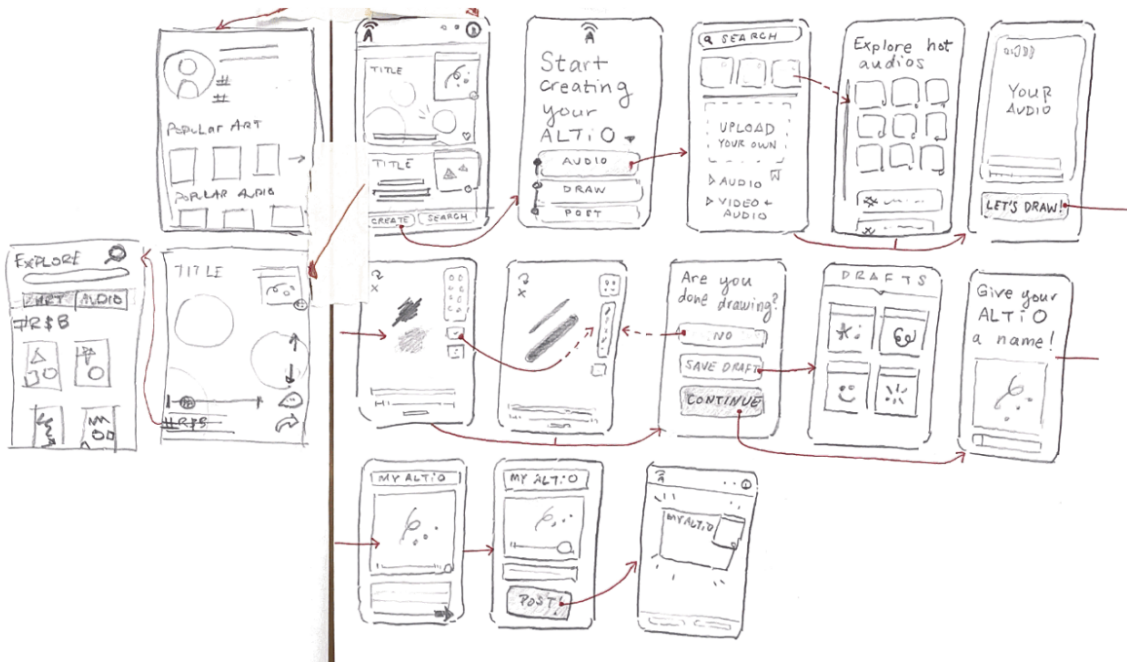


Figure 5: Concept Sketch 1 – Native Social Media App

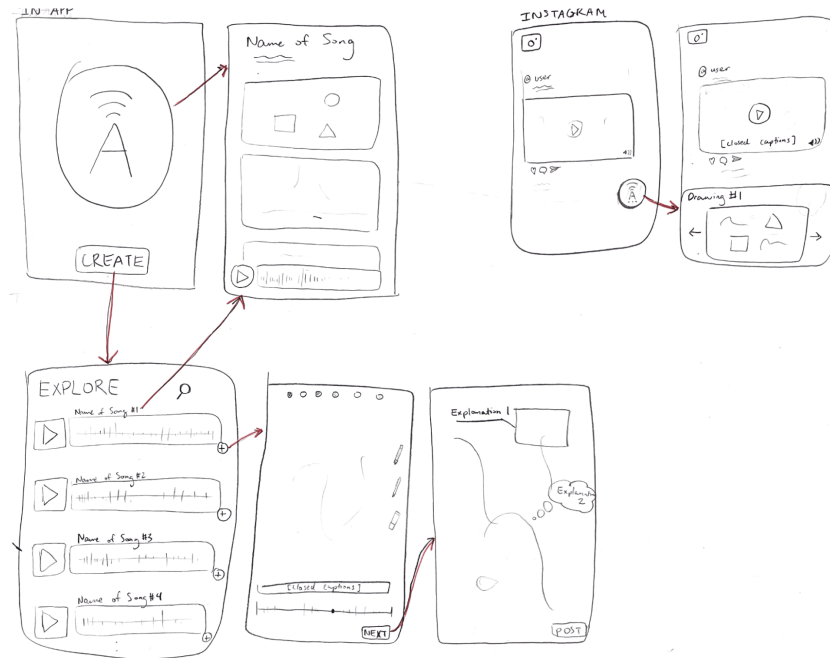


Figure 6: Concept Sketch 2 – Audio Recognition App Extension

Low Fidelity Prototype

In deciding which prototype to pursue going forward—the plug in (Figure 6) versus the native app (Figure 5)—we chose the latter because it *requires* every post to have a drawn interpretation. For the other plug in idea, it would operate like Shazam where users can call up drawn interpretations for any audio they hear. The main issue with the shazam-like plug-in (Figure 6) was that not all content could be guaranteed to have an interpretation due to the crowd sourced nature of the app. For these reasons we built the low-fi prototype of the native social media platform ALTiO using POP by Marvel (Figure 7).

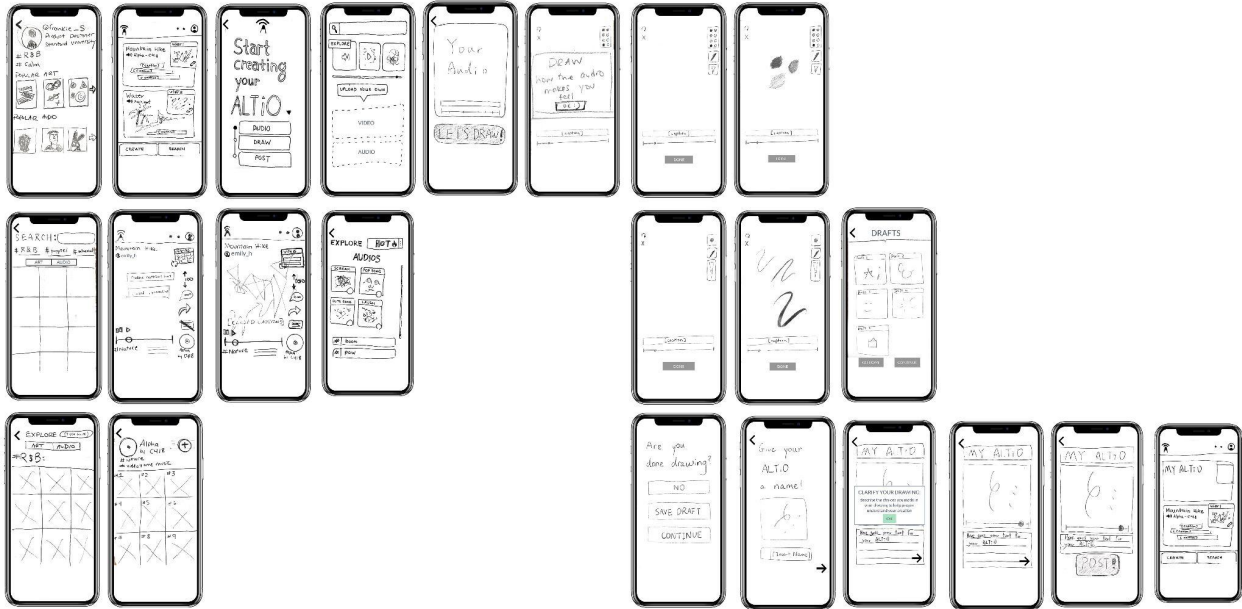


Figure 7: Low Fidelity Prototype

During the process of building our low-fi prototype, we also came up with the three different user tasks for our app and made a task flow for each of them on paper. The user interface in the low-fi prototype sketches was rough, but surprisingly the core design concept has not changed much from our low-fi to final high-fi prototype.

Medium Fidelity Prototype

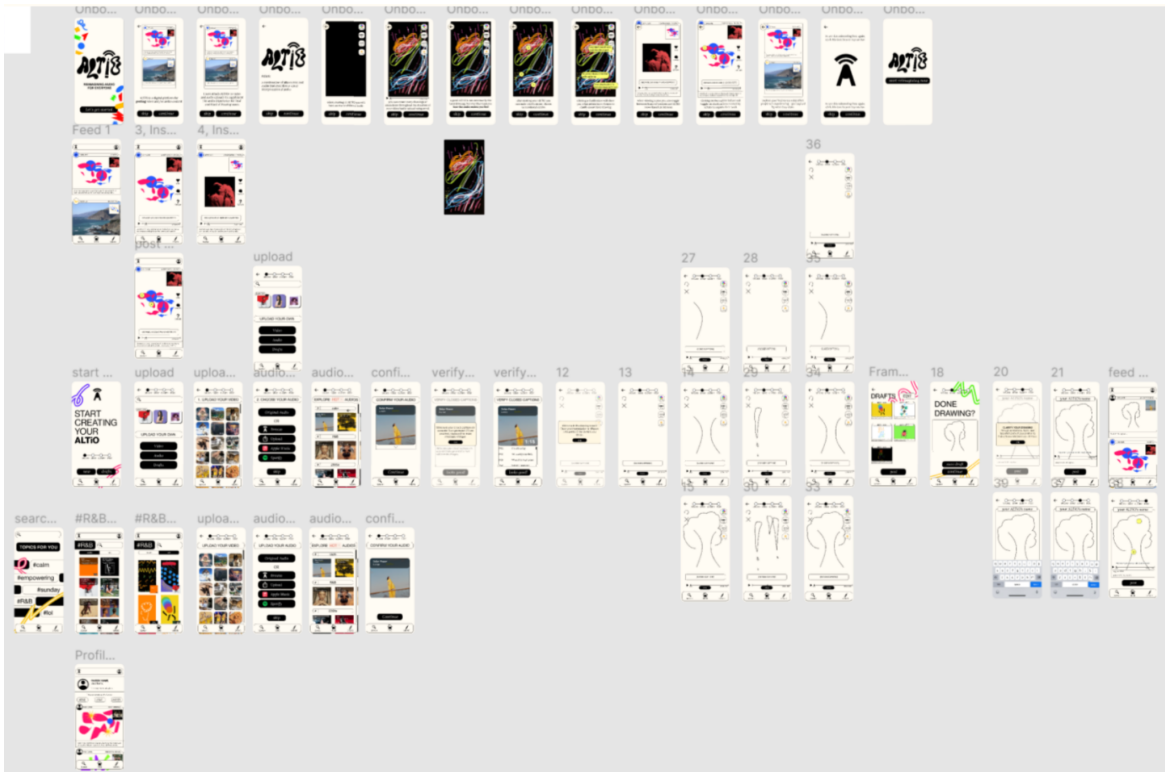


Figure 8: Medium Fidelity Prototype

Moving from the low-fi prototype to the med-fi prototype, we used Figma to build a user interface that looks more fleshed out. We made use of Figma's components for more streamlined and consistent prototype building, including colors and fonts. The design of the app features a minimalist sketch-like background to highlight the artistic emphasis on the app, with colorful abstract embellishments to emphasize what an "altio" might look like, and the nuance that audio and art can capture.

We also made several larger changes from our low-fi prototype, many of which came from users' feedback and suggestions after interacting with the low-fi prototype. Major design change 1 was the addition of an onboarding flow (Figure 9), which helps users better understand the purpose of the app and how to use it. This change was made because we found that the idea of an ALTIO can be quite confusing for people using the app for the first time, and understanding key features like clarifications and the goal of an ALTIO are essential to the app's function.



Figure 8.1: Medium Fidelity Onboarding

In our initial low-fi prototype, we didn't fully explore what the upload process would look like in implementation. Figma allowed us to visualize the different steps users would take in order to upload different types of content, including music or video.

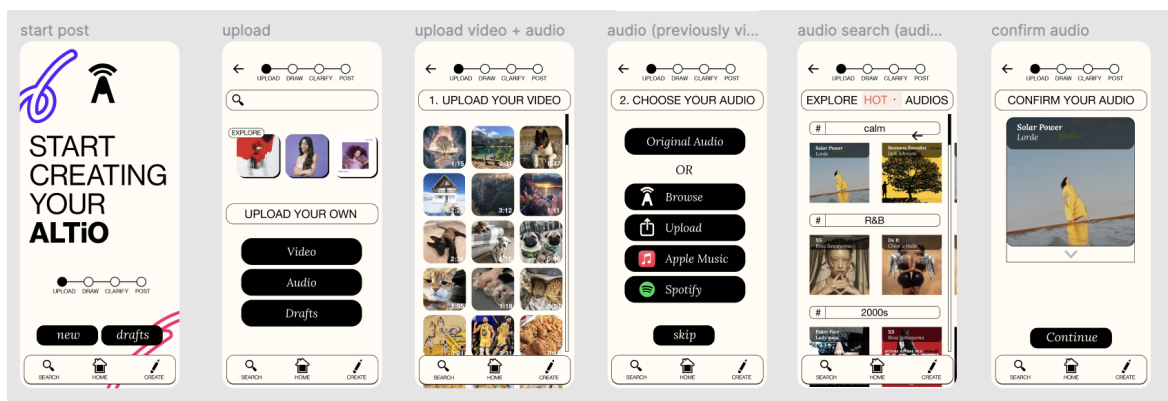


Figure 8.2: Medium Fidelity Upload Sequence

High-fi Prototype Version 1



Figure 9: High Fidelity Prototype Version 1

For the high-fi prototype, we built the first version of the app under the React Native framework in Expo. During app development, we also made small modifications, such as the position, size, or color of buttons, icons, etc., as well as larger departures from the medium fidelity prototype.

One major change was our view on the posting process for users. Prior to this version, we thought about posting content without video (audio only), however we eliminated this feature after consideration of our user base. We wanted to ensure Deaf and hard of hearing folks were centered in this app; an audio only post would not be engaging for a Deaf or hard of hearing user. This change is seen below in Figure 9.1.

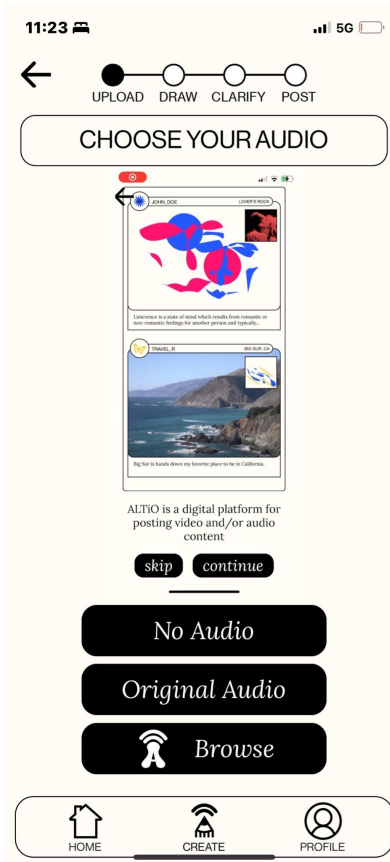


Figure 9.1: High Fidelity Prototype–Version 1, choose audio screen

We standardized the drawing process by only including one drawing per audio to make the experience more palatable for new users, as well as for more ease in development. This was a significant departure from our medium fidelity prototype, where we thought to allow a new drawing at different time points.

We also redesigned the create progress bar (shown in Figure 9.1) and optimized post flow for both conciseness and clarity. There are fewer screens in the new upload sequence.

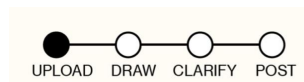


Figure 9.2: High Fidelity Prototype–Version 1, progress bar

Finally, in our onboarding flow, we make a point to specifically mention the goal of ALTiO and the centering of the Deaf and hard of hearing communities in our work. Otherwise, it might not be as clear what the intentions of each post are for.

Hi-fi Prototype Version 2

To continue improving our design, we took our high fidelity prototype that we finished our first quarter with and tested it with Deaf and hard of hearing users. We quickly found errors and points of confusion that lead to many design changes as you can see below.

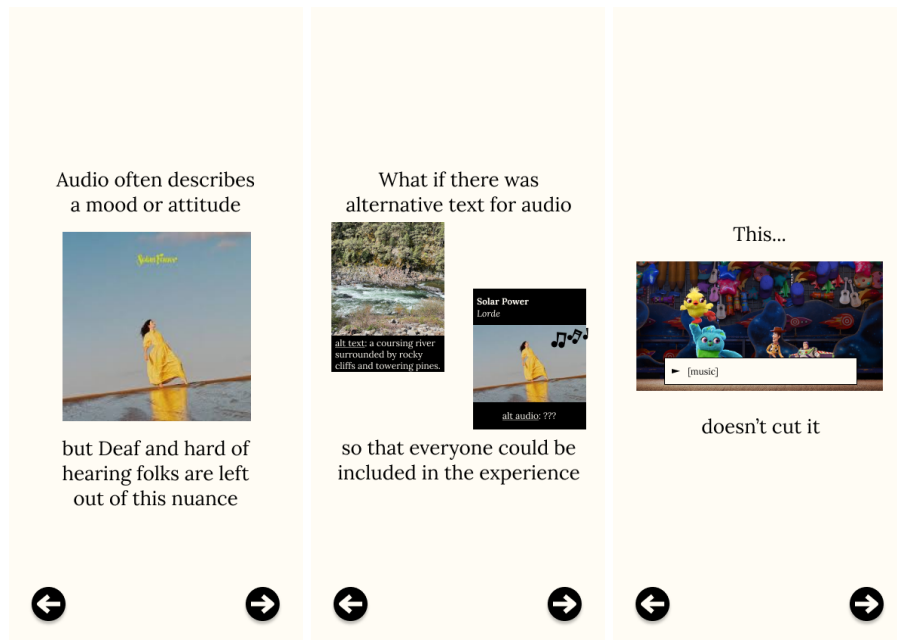


Figure 10.1: Updated Onboarding

Our first and most pressing change was the update of our onboarding. Users spent a lot of time scrolling back and forth through the onboarding and were confused with what kind of content they would be engaging with once they opened the app. In response, we redesigned our onboarding to be a problem solution based approach as seen in Figure 10.1.



Figure 10.2: Account Creation

Our second high fidelity prototype also featured the introduction of the account creation screen because we did not have one earlier. It is important for users to be able to create accounts on our app as we seek to connect and create communities on our platform. See the introduced account creation screen above in Figure 10.2.

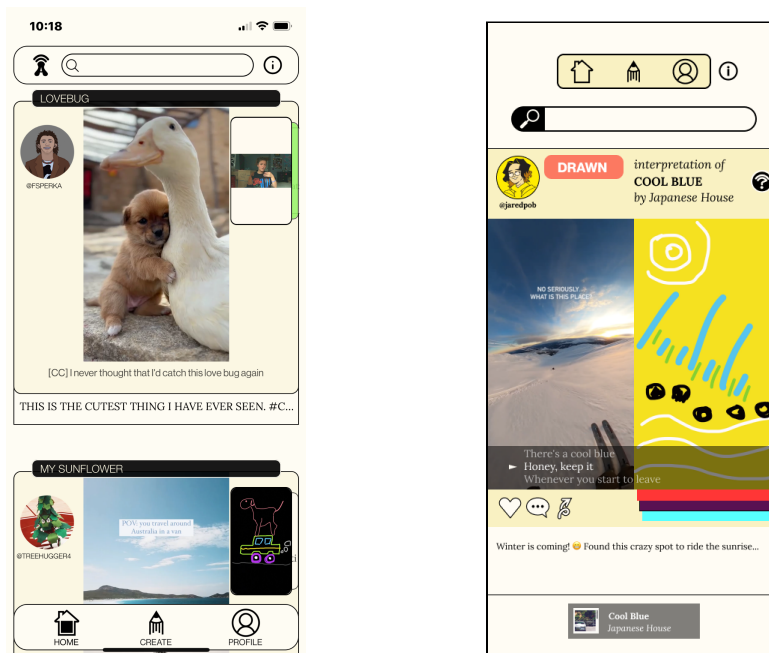


Figure 10.3: High-fi V1 home screen (left) compared to high-fi V2 home screen (right)

Our home screen saw a huge redesign as some of our deaf users mentioned frustrations with not being able to see both the interpretation and the video at the same time. We didn't want to send the message that one piece of content was more important than the other, and we wanted to respect our userbase's emphasis on vision. As a result we designed the home page to feature both the interpretation and the video equally using as much space for both as possible without overlap. We minimized the nav bar to allow for more room, and filled in the remaining content using gestalt principles and the space remaining.

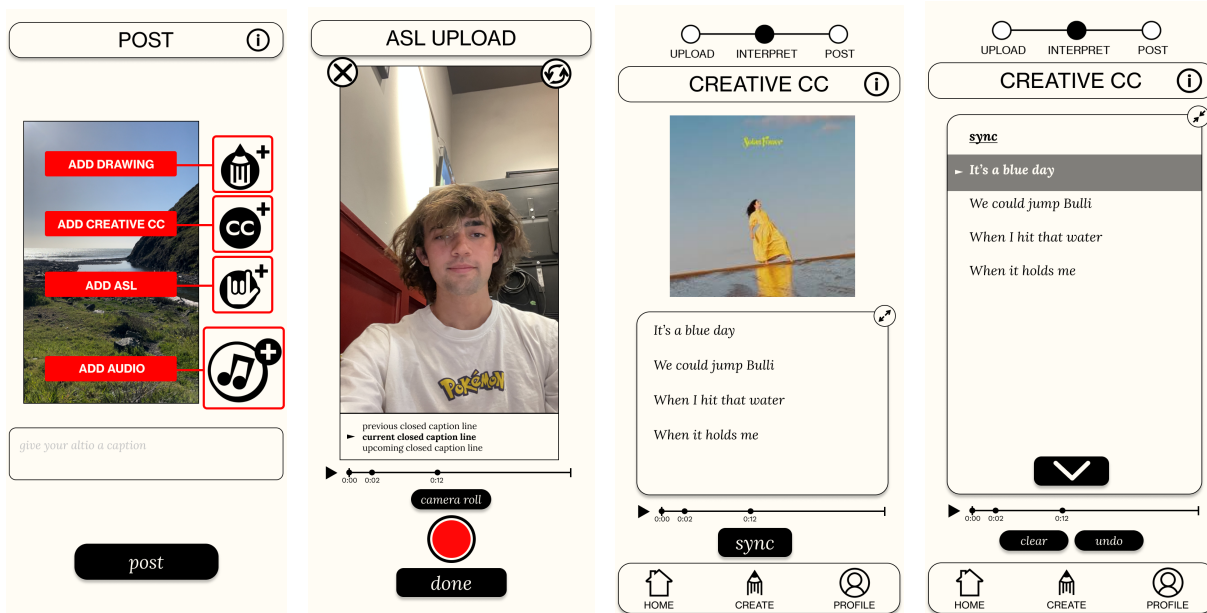


Figure 10.4: Updated create flow (left) and interpretation methods

Another big change that we made in this prototype was adding two new interpretation methods. This was largely due to user feedback from our deaf participants who felt the app was missing an ASL component—which is essential to Deaf culture, and a discussion with a PhD student who is currently working in the audio accessibility space. Figure 10.4 illustrates our first designs of adding these new interpretation methods and the option to include one or more when posting.

Hi-fi Prototype Version 3 (Final)

After making these changes and reflecting on the feedback we received from our first round of participants we took the newly updated high fidelity prototype and tested it again with a new round of participants. Learning even more things to change.

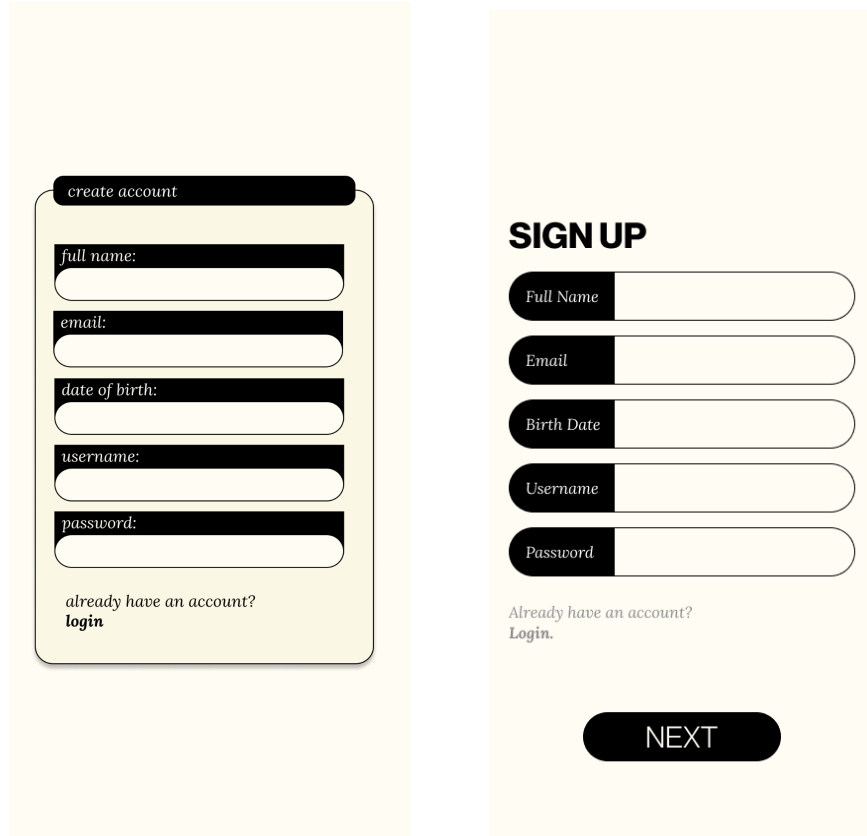


Figure 11.1: Hi-Fi V2 (left) and NEW Hi-Fi V3 (right) Account Creation Screens

Through our next round of interview and testing process, we received feedback from our participants that the text in our account creation screens was challenging to read and that the nested boxes were overwhelming. In response we simplified and enlarged our text and field boxes, and even standardized our buttons throughout the app to match this feeling going forward as seen in Figure 11.1, right.

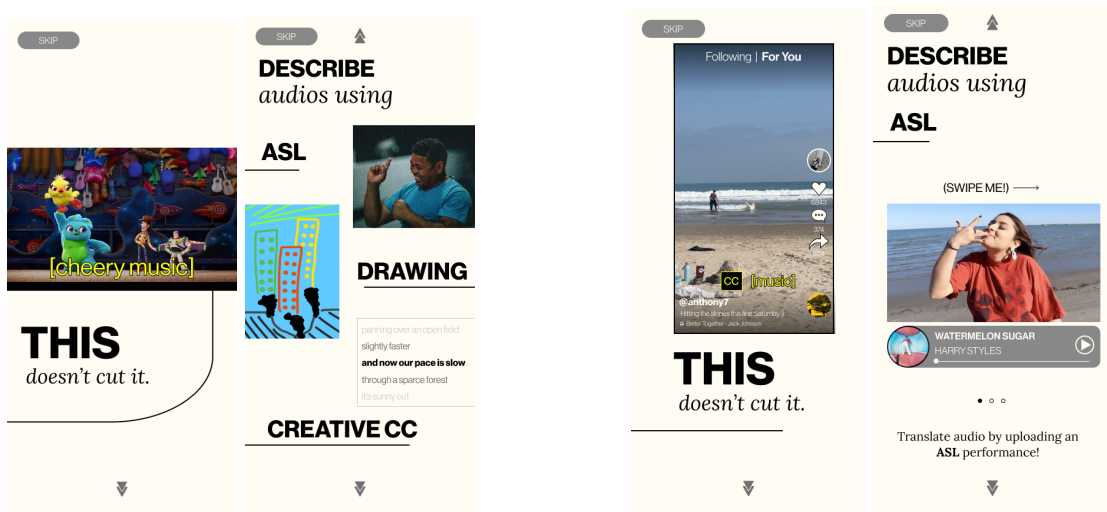


Figure 11.2: Hi-Fi V2 (left) onboarding and NEW Hi-Fi V3 (right) onboarding

Even with our newly revamped onboarding flow, participants still struggled with the content that they saw, saying things like “I was getting more of a spotify vibe than a tik tok”. To better prepare users for what was to come in the app, we emphasized the tik tok feel by having our onboarding look more like a tik tok screen (Figure 11.2) than a movie screen to show what captions were, and we made use of videos that showed interpretation methods (Figure 11.2 far right) to better illustrate what was to come in the app.

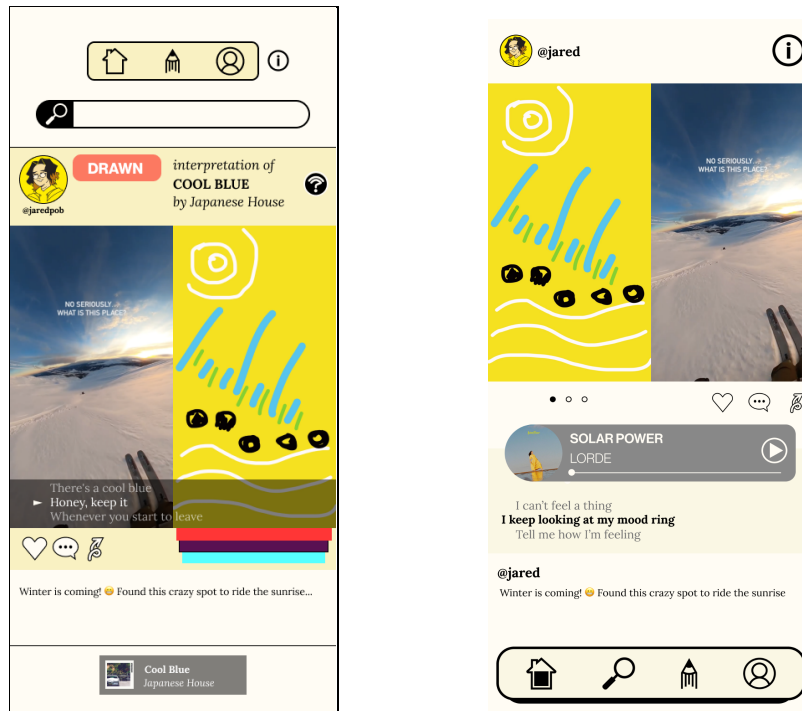


Figure 11.3: Hi-Fi V2 (left) home screen and NEW Hi-Fi V3 (right) home screen

Our home screen also received a clean new polish as users noted our previous home screen was overcrowded (figure 11.3 left). To remedy this, we redesigned the home page to emphasize the nav bar on the bottom (as it is in other apps) and drew on familiar themes from Tik Tok and Instagram. We also were cognizant of white space and tried to make the design feel the least overstimulating whilst still displaying all the key information present on the screen. This final design arrived after nearly ten iterations of the home screen in Figma.

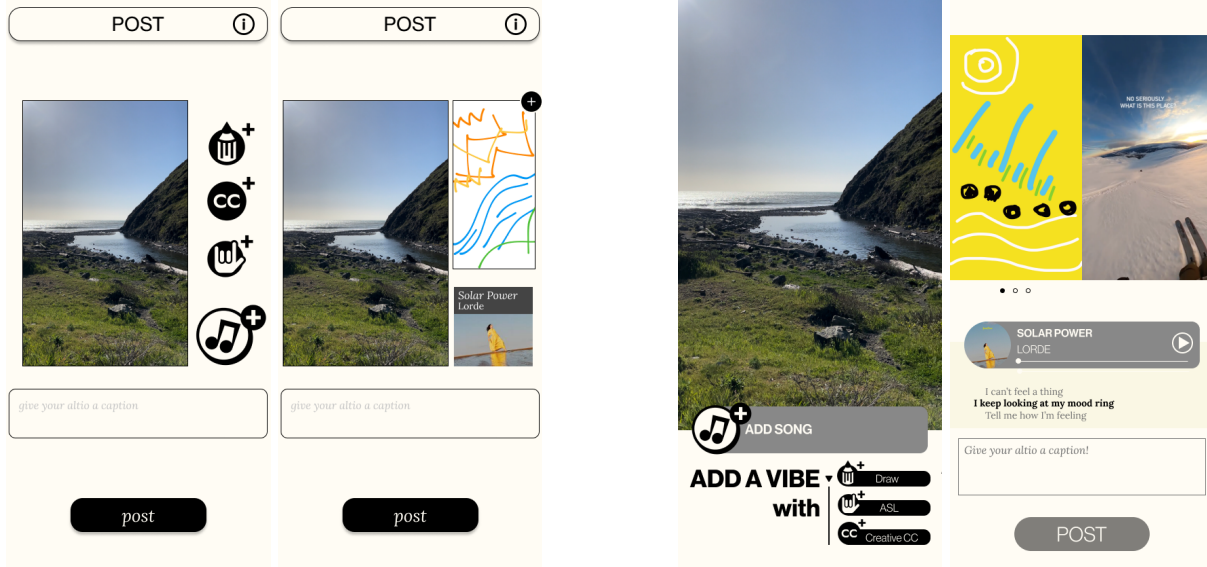


Figure 11.4: Hi-Fi V2 (left) create post and NEW Hi-Fi V3 (right) create post screens

With the recent introduction of two new interpretation methods, we continued to iterate on the create flow design as users expressed confusion and/or reluctance to engage with various interpretation styles. The new design (figure 11.4 far right) features a “home base” that users continue to come back to while posting to allow for increased user control and freedom—whether they want to post three interpretations, or just one.

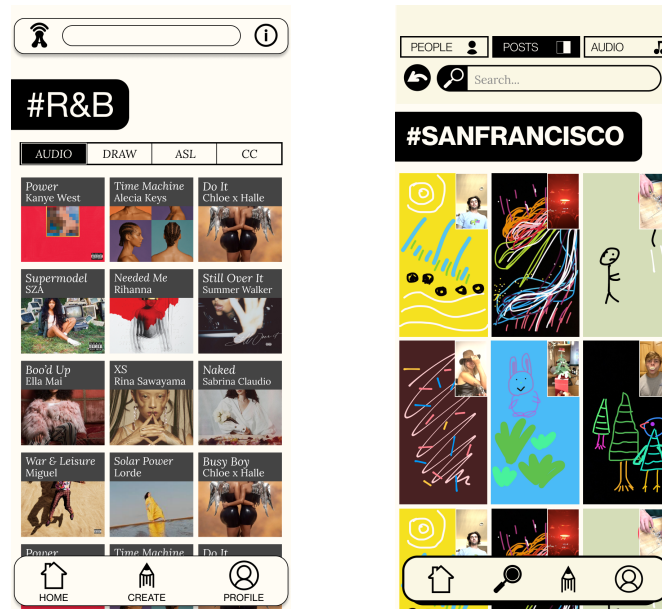


Figure 11.5: Hi-Fi V2 (left) search and NEW Hi-Fi V3 (right) search screens

Our search screen did not see much change throughout our process as users easily navigated to various altios due to its familiar structure; however, with the introduction of searchable accounts and firebase integration with post storing, the search needed to

accommodate users in addition to posts. Because of this new addition, we added various search tags to the top of search based on what users were looking for, and reintroduced the manual search bar to let users find friends and build their community on ALTiO.

Throughout the two quarters, the most valuable evaluation technique was the field usability study. In our experience any time we were able to schedule and work with members of the Deaf and Hard of Hearing community we received the most productive and fruitful feedback. While we were able to work with members of the community during our lab usability study, we refined the majority of the ideas discovered in the lab usability study during our *field* usability study. Watching people use our app with little direction showed us things we would not have thought to ask for, such as the ways people tapped, where they engaged with content first, and even their body language. These observations gave us insights into what about our app was confusing and what was intuitive. This feedback, whether it be verbal or non-verbal, was helpful in fine tuning the features of the app.

6. Final User Interface

Successfully Implemented

Our app supports a fully functioning user authentication and interaction system (includes account creation/login as well as following other users). In the home screen, users can view posts of accounts they are following, like and comment on them, and then view hardcoded posts. Users are able to create their own post by uploading a short video clip, which they can then attach a song to (clipping the song is also functional). ASL, drawing, and creative captioning all work as desired, and allow users to create interpretations for their posts. Posts persist across devices, as content is uploaded to a backend, and captions and audio play for each new post. The search screen is fully fledged with different tabs depending on what you want to search - users, hashtags that lead to more posts/audio, or audio. Then, on your individual profile page, you can see posts you created, posts you liked, and who you are following. Editing your profile also persists on the backend (users can change their bio and name, and upload a profile picture).

At a high level, the user interface is similar to using other social media platforms that contain short form video content, like Instagram or Tiktok. The main difference is the interpretations that exist next to the video post (interpretations are on the right, video is on the left). Users can swipe through these interpretations if there is more than one interpretation, and can tap on the video to mute/unmute. Below are captions for audio (if playing), and a card that shows the current audio playing along with a scrollbar displaying the position in the audio. Liking the post saves it so you can see it on your profile.

Users are also able to upload a post and interpretations they want to include. If an audio is selected, in each of the interpretation methods, the audio will be playing while interpreting.

Unimplemented

The main feature left unimplemented was the connection with Spotify. Unfortunately, we didn't hear back from Musixmatch who provides all real time captions for Spotify (and seems to be the only such provider), and we wanted to ensure that all audio had captions available. We also didn't have a sharing feature for posts, or a report feature. These two took less priority compared to other features. We had hard coded user content to fill up the home screen when users either aren't following anyone or have already viewed all of the posts of people they follow. Additionally, all available audio is hardcoded.

Implementation Tools

We used the Expo Go platform to develop our app in the React Native framework. We used Github for source control, Firebase for authentication and their realtime database, and AWS for storing post content. For design, we used Figma and the Adobe Suite.

- Expo Go simplifies a lot of the process in using and setting up React Native for app development, and sharing the app with others. However, it also has a lot of limitations, such as not being able to use libraries with native code.
- Github was generally easy to use and share code with others, though occasionally we ran into issues that we couldn't easily deal with.
- Firebase was generally very helpful, occasionally difficult in knowing how to call necessary functions and in actually having accessible data storage.
- AWS was useful for posting content, but difficult to set up and know how to use without using their Amplify services.
- Figma was easy for real-time collaboration on UX related tasks, and in fleshing out screens as much as we wanted. Adobe Photoshop and Illustrator were used to make custom icons and assets for the app.

Downloading

Link to [README](#) for downloading and using the app.

Download Instructions

Download Expo Go and use the username/password as provided in the README. Choose "altio3" and the default channel.

7. Making It Real

**Meet
the
team**

DEV
EMILY HUANG
COMPUTER SCIENCE, '22

DEV
HANNAH KIM
COMPUTER SCIENCE, '24

UI/UX
JARED POBLETE
SYMBOLIC SYSTEMS, '23

UI/UX
FRANKIE SPERKA
PRODUCT DESIGN, '24

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Emily Huang is a co-term studying Computer Science at Stanford University. She has worked on various projects in various areas as a data scientist and developer.

Hannah Kim is a sophomore studying Computer Science at Stanford University.

Jared Poblete is a junior studying human-computer interaction in Symbolic Systems at Stanford University. He has worked as a graphic designer for branding and advertising, and as a marketing coordinator.

Frankie Sperka is a sophomore studying Product Design at Stanford University. He has worked as a UX researcher and needfinder, and has studied in Stanford's d.school and product design curriculum.

Business Model

We would likely rely on an advertisement based model to make it viable, in order to ensure that it would be free for all users. Additionally, we may rely on donations/grants related to accessibility in order to help fund our work. Our revenue streams would be advertisement based. This might include sponsored content that shows up periodically in users' feeds as they scroll, or marketing accounts. The customer base includes both Deaf and hard of hearing folks as well as creatives that would be most helpful in interpreting audio (for instance, artists, poets, ASL signers).

The viability of our market opportunity has to do with the initial reception to our product in terms of novelty and usability; launching with full features to an impressionable user base would be key in preserving a sizable market opportunity. The long-term impact would ideally be for increased accessibility across social media platforms beginning with ALTiO.

8. Summary

Our key innovation is the use of different types of visual media to communicate and share the audio experience, subjectively. We believe that the objectiveness of closed captions, while helpful and necessary, doesn't fully capture the nuance that audio may contain.

With our product, our key impact will be for the Deaf and hard of hearing communities that we have been designing for. We will be able to supplement the current options for accessibility that we have found lacking through our research. We hope that creatives can help bridge the gap between the reliance on audio and those who are unable to access it. Eventually, we would hope that this app creates a sort of lexicon that people can rely on to understand audio, and that audio can be accessible for all.