

Digital Prototyping and Extended Reality

Rapid Prototype 1 – Statement of Delivery

Statement of Originality

I certify that all content (images, drawings and assets) used in the creation of this prototype are my own original work. Icons included in the Miro link were royalty free and obtained from flaticon.com

The Concept & Design Process

The application that I have chosen to design extended reality (XR) interactions for is Spotify. Spotify is a popular music streaming app that allows users to play songs from their favourite artists, create playlists, listen to podcasts view artist information, and more. I chose Spotify because I believe music streaming applications in general present a prime opportunity for innovation and increased immersion in the XR space. The combination of audio and visual interactions has the potential to enhance the user experience.

To begin exploring my concept, I have chosen 3 tasks to design interactions for in a XR environment. I chose these tasks as I believe they are some of the most frequently used interactions in the current Spotify application. The 3 tasks I have chosen are:

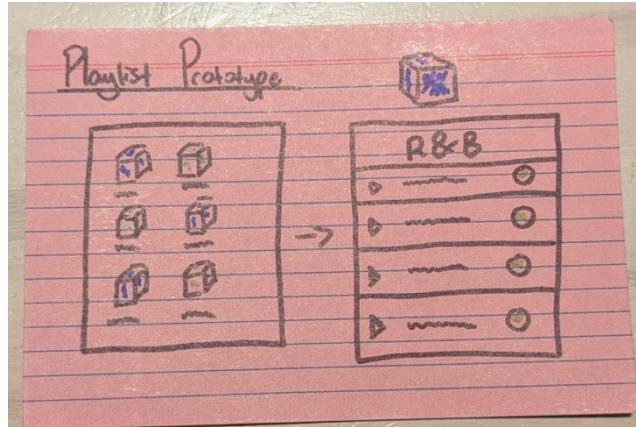
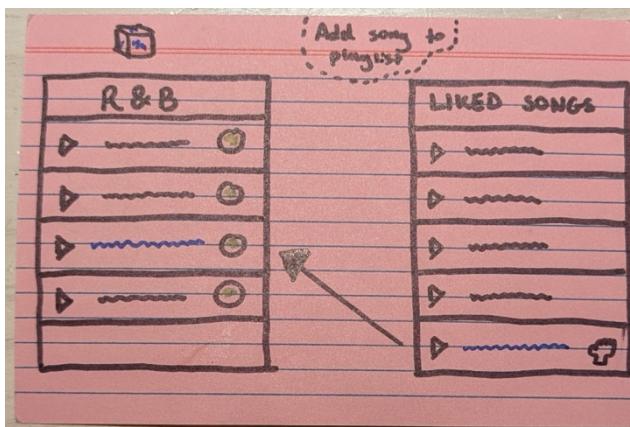
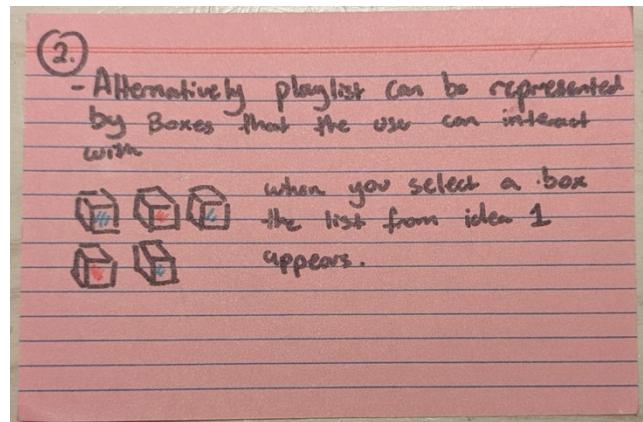
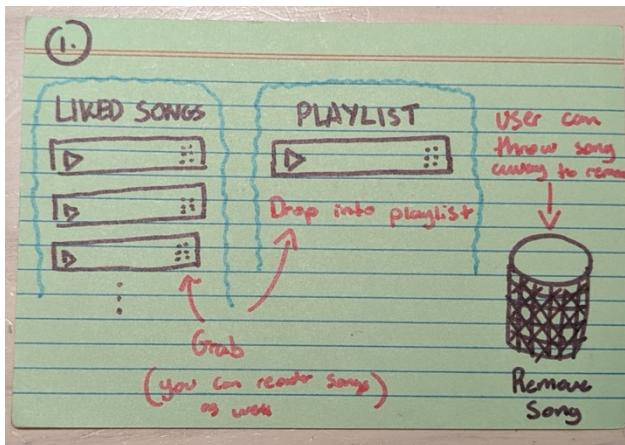
- Adding a song to a playlist
- Removing a song from a playlist
- Playing a song

My concept involves using space around the user to create a visual interface to manage songs in a playlist and play songs within playlists in a virtual space. Due to the rapid nature of this prototype my concept will focus on immersion and physical affordances whilst excluding audio affordances for now. For immersion, I will focus on following the intuitive controls, interactivity and emotional engagement guidelines. For physical affordances I will focus on object placement, that is facilitated by hand interactions and selections. The purpose of using bare hands as the interaction modality is to give the user flexibility and more natural interactions. These hand interactions will include grabbing, point and click and pinching.

Adding and Removing From Playlists

My first step in achieving my goal of creating an immersive XR experience was to sketch out my ideas for how playlists would be represented. Below are my primary sketches outlining my ideas of how playlists will be represented in the XR environment. Figure 1 shows that playlists (note that liked songs are a type of playlists) will be represented by movable floating cards with each song in the playlist being represented by a rectangle. Each rectangle allows the user to play the song, displays the song name as well as chevrons on the far right that allow the user to reorder songs in the playlist and move songs in or out of the playlist. To remove a song from a playlist, the user can pinch the

chevrons and throw the songs away in the trash. Figure 2 builds upon this representation, but instead of displaying playlists as cards, they are represented as cubes that users can grab, move around and select to view the card representation in figure 1. Figure 3 attempts to combine the two previously described ideas but replaces the chevrons with circles the user can tap to select one or more songs. Once songs are selected, the user can rearrange or move the songs as they see fit.



Figures 1 - 4

Playing a song

Playing a song presents a unique opportunity for increased immersivity. Figure 5 below outlines my idea on how a user could play songs from their playlist. My hope is that by allowing the user to play a song like this it fulfils the immersion guidelines previously outlined.

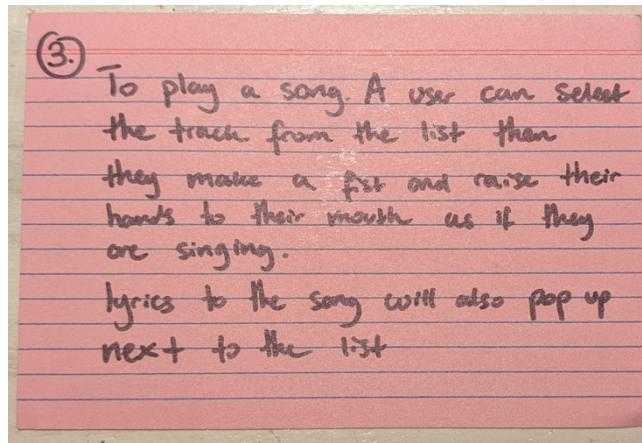


Figure 5

Storyboards

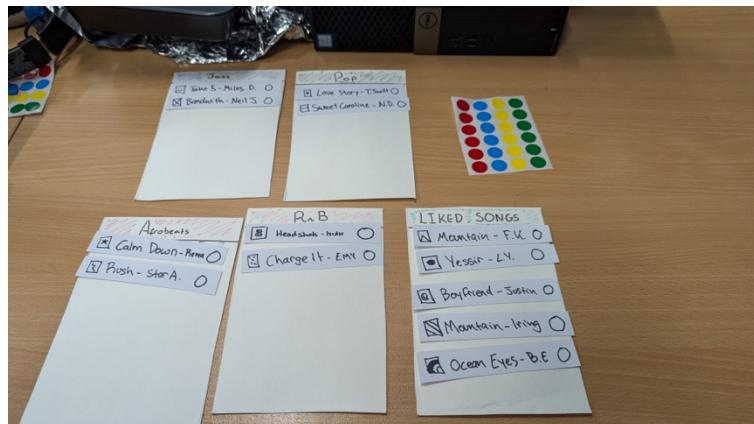
The following section attempts to add more clarity and detail to the interactions previously described. Three storyboards are presented, each outlining the process of interaction in completing the given task. The storyboards can be found in the miro link at the bottom of the document.

Rapid Prototype Building, Testing Agenda & Protocol

My next step after completing my sketches and storyboards was to build my rapid prototype and design a testing protocol, agenda and evaluation method. My goal is to create an intuitive interface that needs as little hints and instructions as possible. Therefore, the aim during my testing, is to determine if the affordances and interaction paradigms I have designed are intuitive enough for the user to complete the required tasks with minimal instruction. For example, I would like to observe the different ways users interact with the songs and microphone to play a song. Whether they perform the interaction in the way I expect or choose an entirely different route. In summation I would like to test how the physical and visual affordances provided to the user influences the completion of a given task. Because I am looking to test physical and visual affordances I will exclude the use of audio at this stage. This is because I believe audio cues will serve to strengthen and support already refined interactions.

Building the Rapid Prototype

Figures 6 and 7 below show the completed rapid prototype that users will interact with during the testing sessions. As outlined in my sketches, playlists are represented by cubes the user can interact with. These were built out of Play-Doh, whilst the cards representing the playlists were built out of heavy construction paper. Each song was cut into rectangles with the play button being omitted from the original sketches.



Figures 6 & 7

Testing Protocol:

The following section outlines the testing protocol that will be used during the testing session. My desired interaction flow for each task can be viewed in the storyboard section of this report as well as the video. However, since the goal of this testing session is to observe how physical and visual affordances influence task completion the; my initial instructions are kept broad.

The testing session consists of a brief introduction explaining what application the user will be testing, what tasks they will be asked to do and time for the user to familiarise themselves with the prototype and/or application. The user will then be asked to complete the tasks, and once they are complete a few short evaluation questions will be asked to the tester. Notes will also be taken whilst the user is completing the tasks.

Testing Protocol Outline/Script

Introduction: Explain to the participants that they will be testing interactions for the Spotify application. They will testing 3 interactions relating to the Spotify application. The three interactions they will be tasked with performing are:

- Add a song to a playlist from your liked songs
- Remove a song from a playlist/liked songs
- Play a song

Ask the participant if they are familiar with Spotify.

If the are **not** familiar; explain what Spotify is and walk the user on how to perform these functions on the mobile/web/desktop application

If they **are** familiar ask if the participant would like some time to re-familiarise themselves with the tasks they will be asked to perform in the mobile/web/desktop application

Present the rapid prototype to the participant and explain what each of the objects represent:

- Cubes represent playlists which can be moved around and can be tapped to view the songs in the playlist
- The microphone and trash can be moved around as well but do not explain to the user how to interact with these objects to allow them to have their own interactions.

Once the user is ready ask them to complete the following tasks and think out loud whilst they are completing the tasks:

Task #1 – Add Song to a Playlist: Please add one or two songs from your liked songs to any playlist of your choosing

Task #2 – Remove Song from Playlist: Please remove any number of songs from a playlist of your choosing

Task #3 – Play a Song: Please play a song from any playlist of your choosing

Conclusion and Feedback Questions

How would you describe your overall experience completing these tasks?

Did you face any challenges when trying to complete any of the tasks?

Is there anything you would modify about the experience/interactions?

Testing Results & Evaluation:

The following section outlines my results from my testing session. Table 1 below lists the participants and their tasks they performed. For each task I have described what the participant did as well as notes I took during testing, if any. Responses to my evaluation questions are also presented.

Participant	Task 1	Task 2	Task 3	Additional Notes:
Participant 1	Used voice to open playlist. Grabbed cube and ripped chunks out of cubes to move a song from liked songs to a playlist	Placed chunks they ripped out into the trash	Picked up chunks and dragged it to the microphone to play song	Seemed confused at first on how to interact with the prototype at first. Wanted to user their voice to complete some tasks
Participant 2	Ripped chunk out of cube to move a song from liked song to a playlist	Picked and grabbed cube and placed closer to them to open playlist. Did not use the trash. Placed the song to the side in open space	Grabbed microphone and dragged the microphone to the song	Participant changed interaction with playlist between tasks 1 and 2
Participant 3	Tapped cube to open playlist. Tapped song to select. Pinched and moved song from liked songs to playlist	Tapped multiple songs in playlist and moved each individual one to trash	Picked up microphone and tapped the microphone on the song in the playlist	N/A
Participant 4	Grabbed and moved cube closer to them. Tapped the cube to open playlist. Pinched song and dragged song to playlist	Pinched song and placed it in the trash	Pinched whole playlist and dragged it to the microphone	Seemed confident interacting with the prototype. Mentioned they had used VR headsets before. Space seemed to be an important factor
Participant 5	Tapped cube to open playlist. Pinched song and dragged song to playlist	Pinched song and placed in the trash	Selected a song and dragged it to the microphone	Seemed confused at times but confident using prototype and making decisions. Mentioned they had use VR headsets for training at work.

Evaluation Questions

How would you describe your overall experience completing these tasks?

Participant 1:

- Once they got into it they found interactions intuitive. Found it overwhelming at first not having instructions or popups.

Participant 2

- Was very confused about how to be interacting with prototype
- Enjoyed the open-endedness and freedom to choose interactions
- Separating songs by genre didn't feel very intuitive

Participant 3

- Found completing the tasks quite intuitive
- Didn't find the gestures available very exciting
- Enjoyed separating things by genres

Participant 4

- Said the experience was fine (asked participant to expand but did not give much more helpful feedback)

Participant 5

- Found the experience pretty good. Especially tapping and grabbing the playlists; found that straightforward

Did you face any challenges when trying to complete any of the tasks?

Participant 1

- Was initially confused about how to complete the task

Participant 2

- Wasn't sure how to put a liked song into a playlist

Participant 3

- How to get song into the playlists wasn't very clear
- Would have liked more instruction on the options available to complete a task

Participant 4

- Felt confused until they saw playlist representation

Participant 5

- Was confused about what the circles next to each song represented

Is there anything you would modify about the experience/interactions?

Participant 1:

- Having more information popups or icons giving more instruction
- Use a speaker instead of microphone to represent playing a song

Participant 2:

- Would have liked the inclusion of sounds

Participant 3:

- Wanted more intuitive or fun interactions

Participant 4:

- Microphone representation was confusing
- Was confused by the symbols next to the songs (circles and song art)

Participant 5:

- Desired more feedback when completing tasks

Evaluation Outcomes & Reflection

Overall, the testing session was valuable and I believe I gained valuable insights about the current state and future directions I can take my prototype. I was able to see how my design decisions and affordances I provided the participant influenced decisions. Firstly it was encouraging to see that all participants interacted with the cubes by picking them up, grabbing, moving, tapping and in some cases ripping chunks. In future prototypes I will keep these physical affordances and maybe explore the idea of ripping chunks from cubes. A common theme between participants was confusion on how to begin interacting with the prototype. In future I will consider trying to add things like popups and hints to guide the participant. Additionally, I will consider ways to make visual affordances more clear. For example, many participants didn't associate the microphone with playing a song but liked the idea of using it to play a song once I explained. In this case I will consider changing the microphone to a speaker as maybe more participants would associate a speaker with playing music. Another large area for improvement will be how participants interact with moving songs. Only one participant tapped songs to select, which was the intended interaction for selecting and moving a song. Which means there is an opportunity to redesign this interaction. Finally, it was interesting to see that participants who had experience using VR headsets seemed more confident in making decisions about how to interact with the prototype. Additionally, I found it challenging to take notes whilst also observing the participants, evidenced by the lack of additional notes. In future, I will record audio to lighten my burden.

Miscellaneous:

Link to video: <https://drive.google.com/file/d/1iUgi56JYe-AW9s2Z3F2iVOg2hRGBvONP/view?usp=sharing>

Link to Miro Board:

https://miro.com/welcomeonboard/cVpkc1pidlhyU1BSbnpoUFFTTEgxY3BpbXBwdVNOcU9Ka1p3ZkR5T1g0NVhGMzZtZThEMGZoSnFTRkdIWVVVVXwzNDU4NzY0NTg5NTQ3NDc2NzkxfDI=?share_link_id=13884337312