



Roaming DJ

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Introduction

Performing an activity with a friend, whether it's having a simple conversation during a lunch break or going for a jog through the neighborhood strengthens the connection with that person. Robert Putnam, a keen observer of engagement, uses the term *social capital* to describe the “connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them” “that enable participants to act more effectively to pursue shared objectives.”¹ In today's world, social connectivity can be a criterion of a personal ranking system along with wealth, good looks, athletic ability, etc. A person with more digital contacts--social capital--is often afforded a higher status.

While sharing one's attention or focus is a basis for communicating and forming stronger relationships, oftentimes the environment isn't conducive to creating these bonds. For example, a person may bring a friend to the gym to exercise with, but once that person plugs into a music player, video player or other device, he effectively cuts off audial communication. While the two might be sharing the experience of lifting weights, the rush or enhanced experience that either will achieve listening to their music can differ greatly. Researchers Costas Karageorghis and David-Lee Priest of London's Brunel University have demonstrated that music can enhance a person's exercise routine, perhaps explaining why most people listen to music at the gym.² While exercise classes exist that use music to sync routines (like spinning classes that blast music to keep up motivation), there isn't a platform available to sync a routine privately in a space. Since music has been known to produce flow states³—or states of high intrinsic motivation—and shared activity can also produce a flow by means of building social capital⁴, it can be inferred that shared activity and music can produce a shared peak flow experience.

The purpose of Roaming DJ is two-fold: to facilitate shared experiences in settings not necessarily designed to be accommodative to sharing; and to enhance the social status of

¹ Putnam, R. D. (1995). Tuning in, tuning out: The strange disappearance of social capital in America. 28:664-83.

² Karageorghis, C., & Priest, D. (2008). Music in Sport and Exercise : An Update on Research and Application. *Journal of Sport Sciences*.

³ Csikszentmihalyi, M. (1997). Finding flow: The psychology of engagement with everyday life. 29.

⁴ Ibid. 81.

the users. Ultimately, the shared experience of the Roaming DJ application can increase a person's own social capital.

Sherry Turkle, who focused her research on human-computer interaction, observed and coined the term *alone together*. While attending a conference she noted that people were paying more attention to their own devices than the speaker in the front of the room. She wrote, “It was clear that what people mostly want from public space is to be alone with their personal networks. It is good to come together physically, but it is more important to stay tethered to our devices.”⁵ It appears in Turkle’s reflection that there is an ironic lack of group cohesiveness in this communal physical setting. Even when people of common interest ostensibly gather to engage with one another, their behavior is in fact counterproductive to engagement.

In public, it appears that people tend to focus on their own electronic devices without regard to other persons around them. This phenomenon can be observed in public settings like subways, shopping malls, and sidewalks. Locations like these that are often referenced only by a generic name such as a bus stop, an airport terminal, a conference center, or a gym, and void of any anthropological meaning are called *non-places*, and they exist everywhere. Conversely, *places* are locations that are relational, historical, or tied to identity, and as such, are bound to memory.⁶ Roaming DJ can alter a person’s definition of their environment through social interactions experienced in a non-place. These generic *non-places* are able to then become *places*.

Since non-places inherently allow for populations to come together yet remain unconnected in a common location, they are an interesting venue to explore opportunities that impact a person’s social capital. People can sit side by side at a bus stop or in a different non-place and rather than interact with one another, they choose to interact in their digital social sphere.

In-flight entertainment in the 1990’s was a factor that impacted the enjoyment of travel. Back then, a handful of screens served the same content cabinwide. Passengers could

⁵ Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other*. New York: Basic Books. 14.

⁶ Augé, M. (1995). *Non-places: Introduction to an anthropology of supermodernity*. 78.

access the audio content through a plug in the armrests of each seat. All of the passengers who chose to watch the screens shared an experience, and when the movie was over had added an additional reference to their circumstantial relationships. Nowadays, each headrest contains a screen for a custom personal experience. This shuts out other passengers and creates an attention gap. I believe there can be a sweet spot—a compromise between old and current technologies that allows for people in a non-place to be connected and build social capital through their personal technologies and devices.

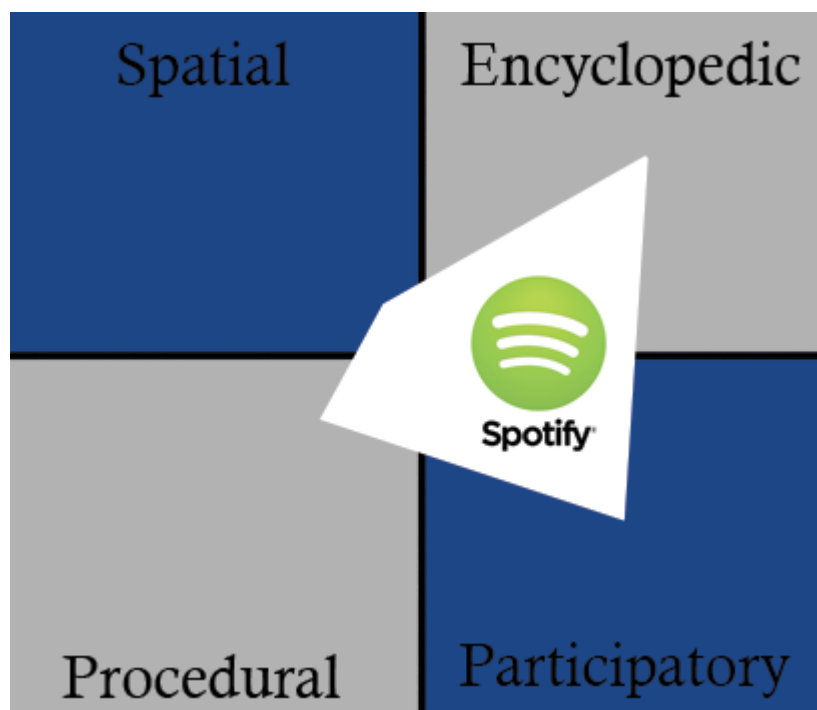
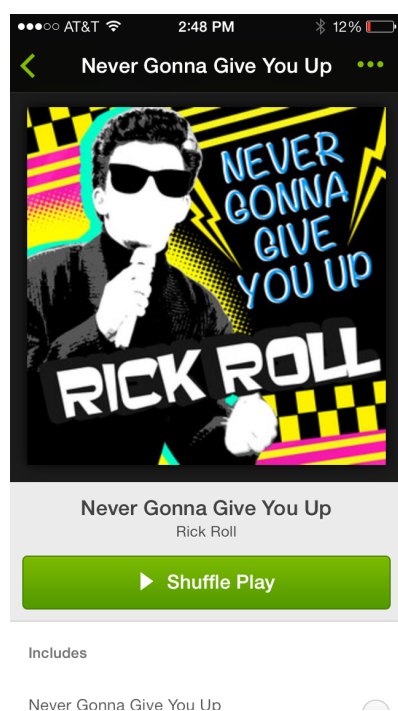


Examining Existing Artifacts

Janet Murray outlines in *Inventing the Medium*, an affordance grid, a tool that breaks down digital artifacts into four affordances: encyclopedic, procedural, spatial and participatory. The encyclopedic affordance refers to organizational conventions like databases, archives, and encyclopedias. The procedural affordance pertains to how intense algorithmically an artifact is like game engines and search engines. The spatial affordance on the grid refers to how an artifact utilizes digital space like maps and virtual landscapes. The final affordance on the grid is participatory and it deals with whether or not people can use the digital artifact to communicate with one another like blogs and message boards.⁷ The grid of affordances is a means to understand how digital artifacts can be pushed, influenced and developed in different ways in order to classify products and services that currently exist on the market. The grid works by placing a square in the middle of the grid, then pulling out the corners into each area that is featured in the artifact. Since Roaming DJ focuses on sharing music as a basis for building bonds, the following digital artifacts are focused mainly on music and community.

⁷ Murray, J. H. (2012). *Inventing the medium: Principles of interaction design as a cultural practice*. Cambridge, Mass: MIT Press.

Spotify

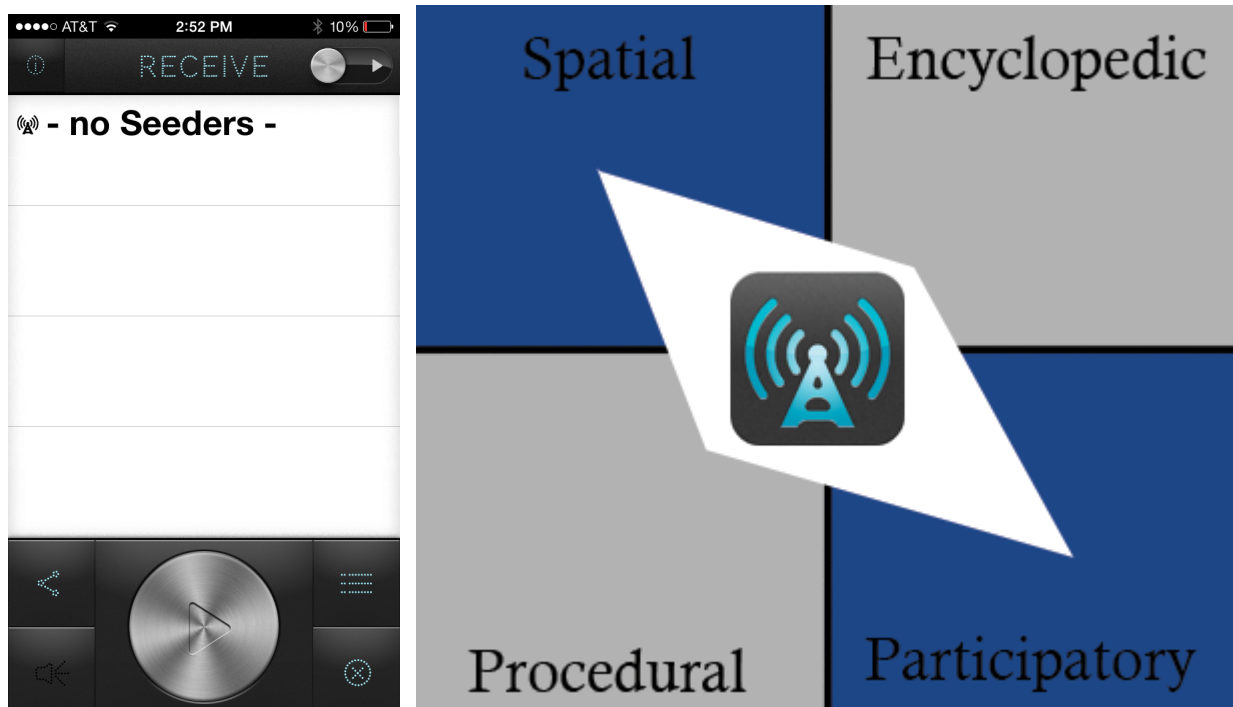


Spotify is an online music streaming service with which a user can build their own playlists and listen to music from a custom library. The non-subscription service lets people listen to whatever they want, splices advertisements into the audio stream, and restricts usage to the registered computer. The premium subscription removes the advertisements, and also allows users to stream off a mobile device. Spotify can also posts statuses to Facebook declaring the track a user is currently listening to with a link to the music stream as a means to share musical preferences. Spotify also allows users to follow Facebook friends on Spotify to see what their friends are listening to inside the application. It also also has an application program interface (API) which allows developers to create their own music applications through the music in the Spotify system.

Because of the amount of archived material that exists in the service, Spotify is categorized in the encyclopedic affordance. By enabling users to communicate with one another, Spotify also meets the criteria of the participatory quadrant. And since Spotify also has an API that allows users to build their own creations, it occupies a spot in the Procedural space. However, there is no spatial aspect to this program, which is a definite

area of interest in Roaming DJ's design since it is attempting to create social interactions through the environment.

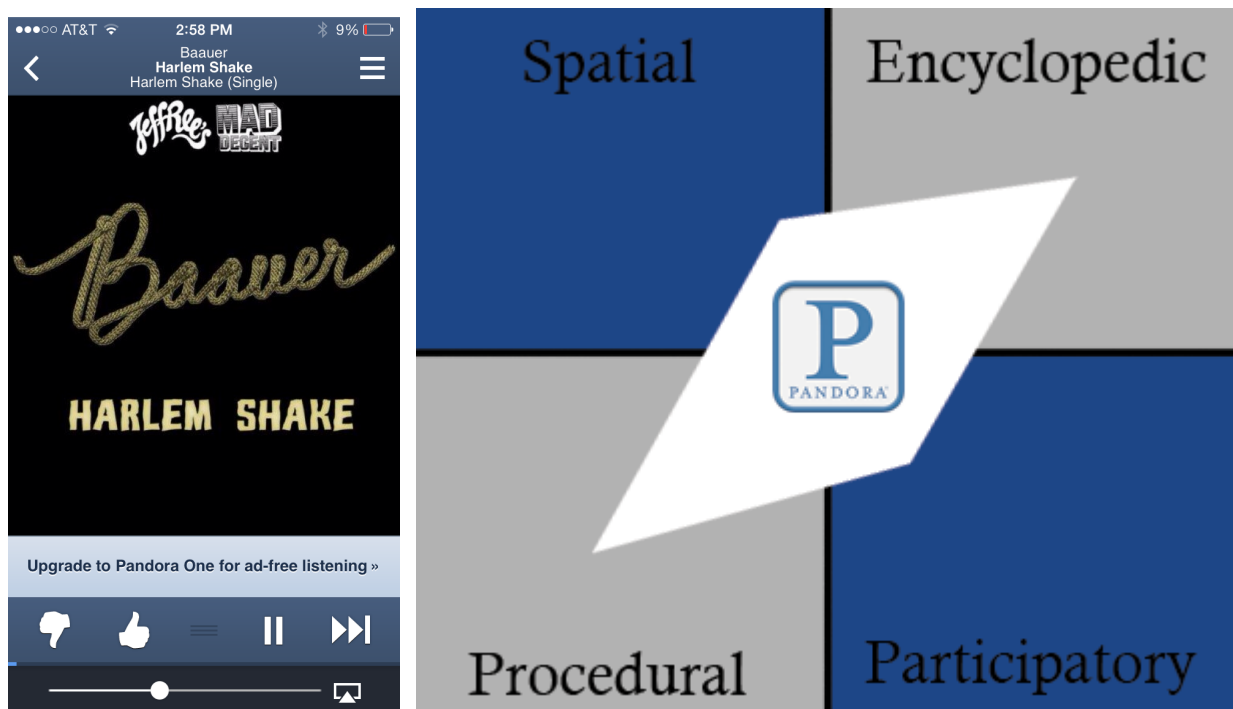
Seedio



Seedio is an application that allows a person to connect multiple phones together for shared sound, but only for the purpose of publicly sharing music in a space that relates more to creating an ad hoc stereo system for parties. This application features sharing music in a round-robin style, alternating devices and songs using a voting system to determine the next song, much like taking turns on a jukebox in a bar. This application has great potential for altering the environment, changing non-places into places, and building social capital. However, it also has the ability to negatively impact the environment and social capital of others not involved in the system since it can be an invasion of auditory space. For example, while patrons of a bar have a reasonable expectation that they may have to endure jukebox choices of others, people in other public environments, like parks or public transit (places where Seedio might be implemented), don't share that expectation, and most don't seem to want to be bothered by another person's music preferences.

Since Seedio requires that users be in a proximate physical location with each other it lies heavily in the participatory and spatial quadrants of the affordance grid. While this is a good example of exploring how people can connect in a space, it lacks the resources to showcase individual style and media content. Roaming DJ can borrow methods of connecting and participation from Seedio, but the application will also need to include a more robust library for storing music and playlists that reflect a user's own solitary preferences.

Pandora

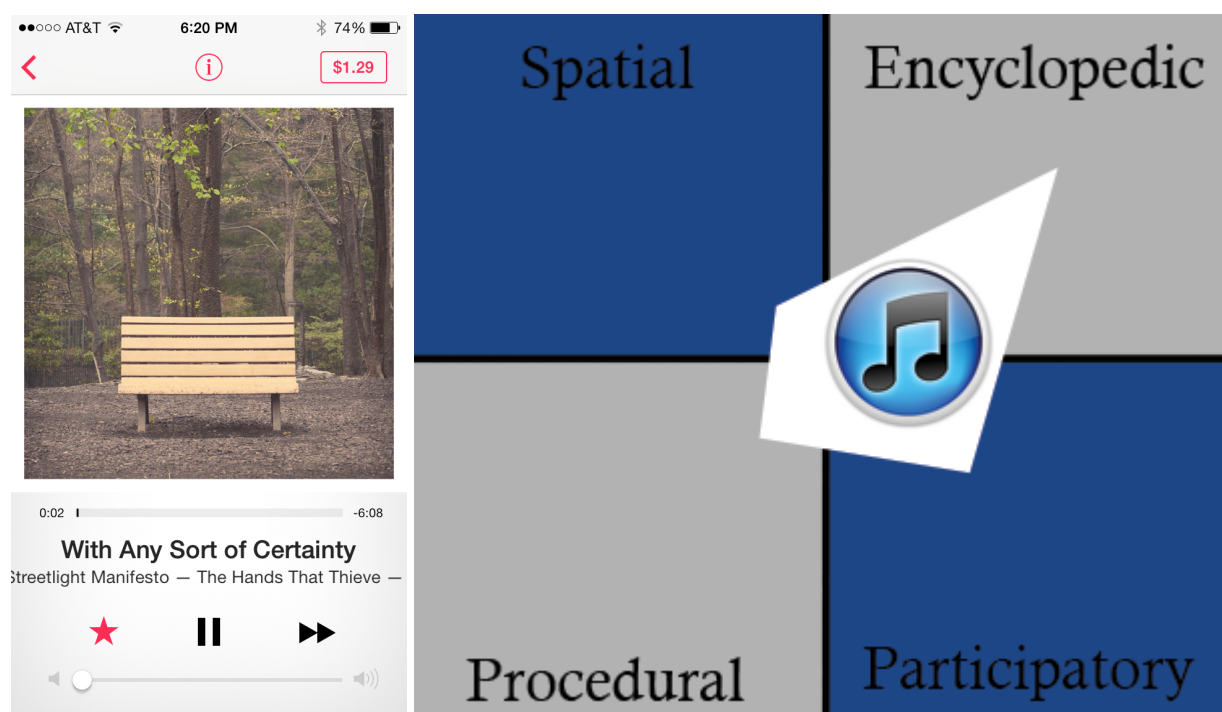


Pandora is an application that exists as a personal Internet radio service. Users are able to enter a song or an artist into the system and the application will generate a music station related to that artist. Users are able to thumbs up and thumbs down music and overtime the system will learn preferences of the user. There is no way to share songs, and listening to the same station across multiple user accounts will not guarantee that users will hear the same song.

On the affordance grid, Pandora sits almost opposite of Seedio, with characteristics that set Pandora in the procedural and encyclopedic quadrants. It is interesting to note the

two extremes between Pandora and Seedio, and how they both exist as applications about music, but are used for two different reasons. Pandora works well as a personalized private music station, and Seedio's usage is more suited for sharing music, taking turns, and transforming a space into a party place. Roaming DJ cannot borrow a lot from Pandora, however a thumbs up thumbs down system can be implemented to reflect the opinions of others listening to a person broadcasting music on the system.

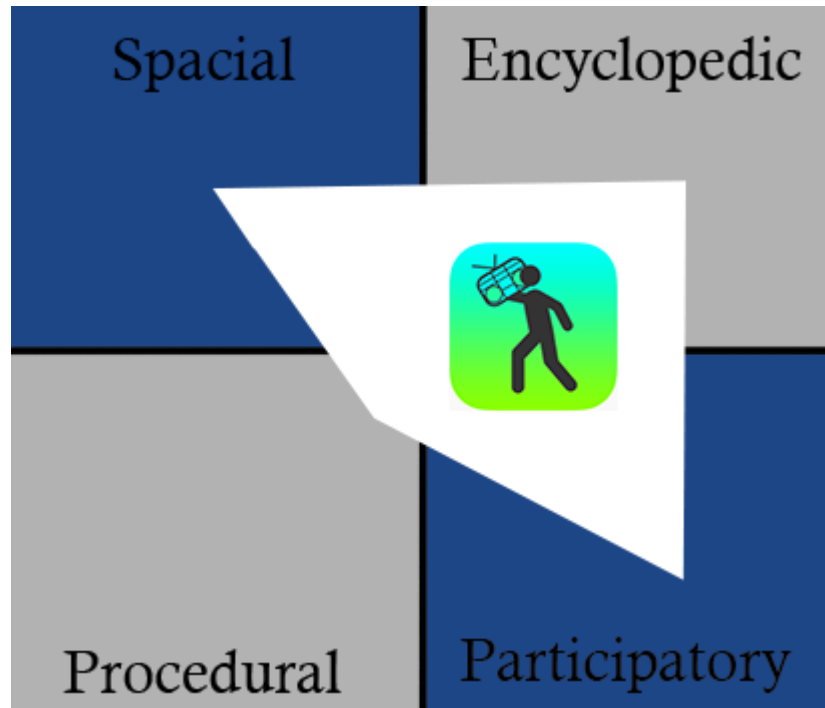
iTunes



While iTunes is mostly thought of as a desktop music library and since Roaming DJ is intended to be a mobile application, it's important to explore the mobile face of the product. On the desktop application, iTunes lets users add their own music to the library, manage playlists, and stream a radio much like the service Pandora provides. On the mobile app, iTunes allows users to purchase music on the fly, stream Internet radio and listen to music that has been loaded onto their device. At one point, iTunes had a social network service tied into the application called Ping. It was a means to share music recommendations with friends and other users, however this aspect of iTunes only lasted two years before it was discontinued. The reasons for discontinuing the service is unclear, but it can be conjectured that iTunes had very low adoption rate for the service.

iTunes encompasses all of the quadrants except for the spatial affordance since it does not venture into virtual landscapes or the geolocation of a user.

If Roaming DJ is to be successful in this venue as a social tool and music player, it has to be able to include the affordances in combination. By combining features from the above artifacts and examining the affordance grids, the ideal balance for Roaming DJ is between participatory, spatial, and encyclopedic quadrants.



While mapping products on the affordance grid can be useful, organizing the services by features in a comparative analysis can also highlight differences and gaps between products. Below is a comparative analysis of the services listed in the section above. The seven categories I chose to explore in the analysis and that relate to Roaming DJ directly are as follows: privacy, multiple devices, gamification, exploratory, storage ability, surveillance, and potential social adaptation.

- Privacy- denoted by the use of headphones.
- Multiple devices- whether it's possible for multiple devices to connect to the same music.
- Gamification- refers to a component that assigns points based on listening to music, the number of listeners, and other variables.
- Exploratory- enabling people to discover music hosted by others.

- Surveillance- denotes whether there are systems in place that track and display the activities of its users to other users.
- Social- whether the status of sharing music with others can be done easily.

	Privacy	Multiple Devices	Gamification	Exploratory	Music library	Surveillance	Social
Spotify	Private	No	No	No	Yes	Yes	Yes
Seedio	Public	Yes	No	Yes	No	No	Yes
Pandora	Private	No	No	Yes	No	No	No
iTunes	Private	No	No	No	Yes	No	No
Roaming DJ	Private	Yes	Yes	Yes	Yes	Yes	Yes

Design Goals

In the case of distributing and broadcasting audio media, current technologies allow music to wirelessly stream off a mobile phone with a Bluetooth connection. Most new cars have that capability (or an upgrade package) that can play a phone's music through its speakers. Similarly, there are external speakers that may sit on a desk that can sync to phones. Y-Splitters provide two headphone jacks for a media device, but can be restricting to movement.

Roaming DJ should create an experience that affords private listening in a public space for the purpose of shared consumption. Some examples of use of the application could include listening to the same playlist while exercising with a partner, biking or jogging with a friend, or sharing music with a stranger at a bus stop.

There are currently three ways music can be discovered: by recommendation, active discovery, and passive discovery. When someone discovers music through a recommendation there is already an established amount of social capital since recommendations require at least a small familiarity with the sender and receiver of the music. Active discovery involves a person researching a particular piece of music with the intention of uncovering something new. This mode of music discovery is how Napster approached peer to peer music sharing. Building social capital isn't addressed by this kind of artifact since it's anonymous connections over a network. It can lead to other discoveries within the peer's folders, but there is no social interaction taken place between users. Passive discovery occurs through osmosis when a person isn't actively looking for music but happens to experience the media in their environment. This type of discovery may transform into active discovery if interest is piqued.

Roaming DJ's design should present a new fourth way to discover music: proximate investigation. Proximate investigation can be considered almost a combination recommending music and active discovery. Strangers are recommending their own music but it also relies on the user to discover the channel. It is different from these two modes mentioned because there is an environmental proximal aspect to discovery. As documented in her research about iTunes music sharing, Amy Volda writes, "Some

enthusiasts even went as far as saying that if someone liked the same music they liked, this created an instant bond which would make friendship far more likely.”⁸ By discovering a similarity in a stranger’s music taste, users can build social capital through the use of Roaming DJ. Barry Brown writes in *Music Sharing as a Computer Supported Collaborative Application*,

“Music is an application that is particularly suited to linking with creating friendship or community bonds, since in the physical world it is strongly linked with social activities. A similar observation comes from the collaborative filtering of friends’ music tastes for each other. This suggests that the music collections of friends, and those with similar music tastes, would be a useful resource for discovering new music. With conventional music media, the enthusiasts we interviewed would look through friends’ music collections to discover new music and experiment with music that they would want to listen to. Therefore there may be value in browsing through other’s on-line music collections as a way of exploring music.”⁹

The application Seedio allows a person to connect phones for shared sound, but only for the purpose of sharing music in a singular space. It relates more to throwing a party with a daisy chain-like linked sound system. Conversely, Roaming DJ should feature a distinct host. Sharing a personal library with someone else helps define a clearer picture of who one is. And as such, the ability to upload music from a user’s alternate music library will be included.

Because the environment and experiences will be diverse from a broad grouping of users, it is helpful to consider participatory design. Participatory design distributes design and innovation across users and creators¹⁰. It is in this nature, through user testing and involvement, users will influence the iteration of Roaming DJ.

⁸ Volda, A., Grinter, R. E., Ducheneaut, N., Edwards, W. K., & Newman, M. W. (2005). Listening in: practices surrounding iTunes music sharing. doi:10.1145/1054972.1054999

⁹ Brown, B. A., Sellen, A. J., & Geelhoed, E. (2001). Music sharing as a computer supported collaborative application. doi:10.1007/0-306-48019-0_10

¹⁰ Björgvinsson, E., Ehn, P., & Hillgren, P. (2010). Participatory design and "democratizing innovation". doi:10.1145/1900441.1900448

While most of the prior examples involve direct interaction with the person whom one is at least familiar, another portion involves using the application as a personal radio transmitter – opening up interacting with strangers in proximity. So in this situation a person would be able to link up to the toughest body builder or celebrity at the gym to hear what music drives his or her workout, or to hear a stranger’s music on public transit. This portion of the application is a gamification of the technology to help motivate interactors towards opening up their social experiences and sharing their music libraries. If a main point of Roaming DJ is to build social capital, motivating users to play a game can be beneficial in creating an initial connection. Points are garnered for connecting to a person’s broadcast, and creating a lasting connection. Both the host device and the guest devices receive points. The host with the largest amount of points at the end of a fixed season gets ranked as a top DJ. The game structure is designed to encourage interactors to not just use the application alone or with friends, but to seek out top roaming DJs or devise strategies to out rank them.

The application should also afford finer granularity control of social experience in a digital environment. Users should be able to control who listens to their music. If a user does not want to participate in sharing their audio stream publicly, they do not have to participate.

Here is a list of the main features included in Roaming DJ I have just discussed:

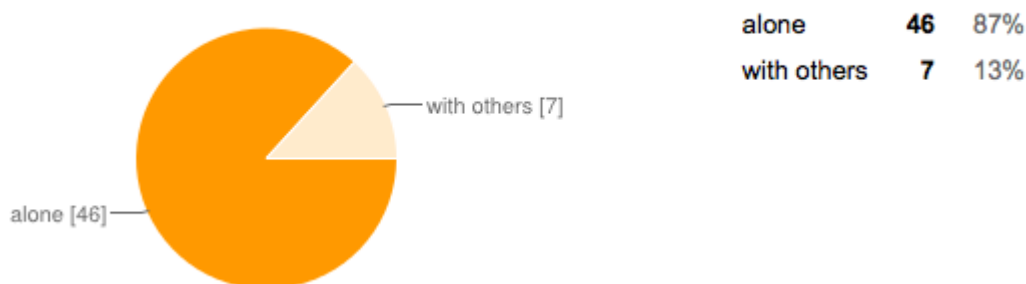
- Sharing music proximately
- Custom and personalized music playlist created by users
- Participatory design influencing iteration
- Gamification of connecting to strangers to promote music discovery and building social capital
- Granularity control of privacy settings

Initial Survey and Creating a Taxonomy

To observe initial reactions, I created a survey prior to the administration of the application to better understand user needs. This also helped establish the market space in which Roaming DJ resides, and what kinds of people would be interested in adopting Roaming DJ. The initial survey helped establish a taxonomy of the different types of users that would be participating in Roaming DJ from which I could better direct designing the application. I released the survey after getting IRB approval for my project and captured results for a weekend. The survey gathered 53 responses.

I broke up the survey into three parts. The first part of the survey asks questions about how people consume music, and what types of settings they listen in. The second part of the survey deals with what kinds of activities are performed with friends, and whether or not they include music in these types of activities. The final part of the survey ask

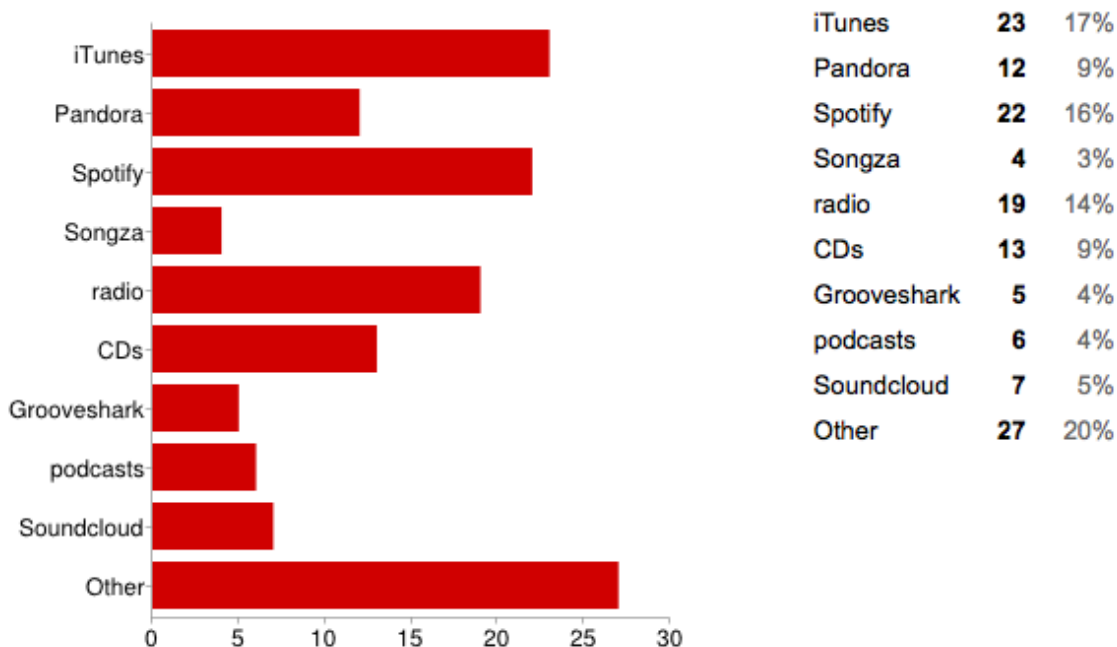
Do you typically listen to music individually or with other people?



questions directly about some of the features of Roaming DJ.

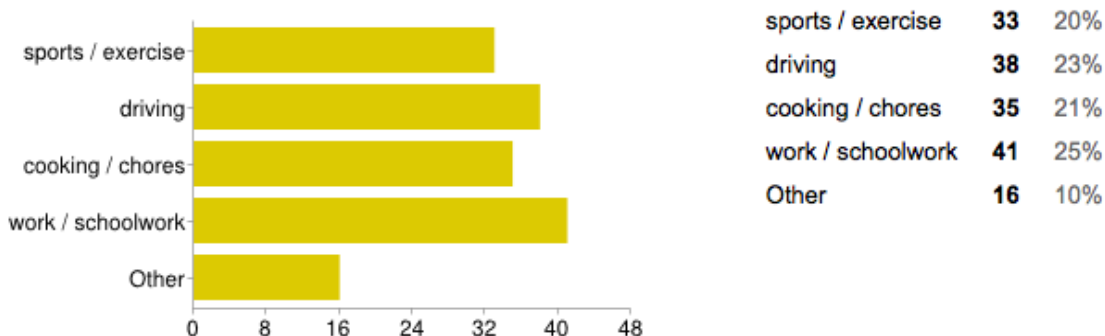
In the first part of the survey, overwhelmingly respondents reported that they listened to music alone. The amount of music they listened to in a given week though, was very contrasted. It ranged from 0 hours to 80 hours of music a week. The mean for this range is 15.8 hours, the median per week is 10 hours, and the mode is just an hour a week. The spread is interesting because it shows that there is clearly a distinction between the ways different people consume music. This lead to more diverse responses to other questions in the survey and also helped identify similar tendencies across different levels of music consumption.

How do you typically consume music?



When asked how they typically listen to music, there is a pretty even spread of usage across multiple services and applications, with iTunes and Spotify being the slightly favored selections. The graph above reinforced that there is a need to allow for users to either be able to run additional music applications alongside Roaming DJ or to provide a

What sorts of activities do you do when you listen to music?

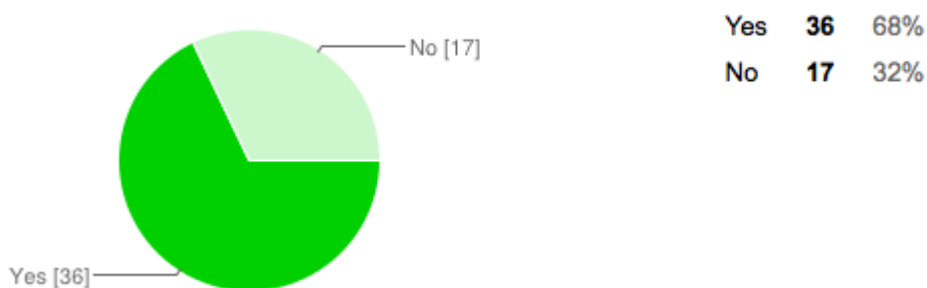


way for users to upload a diverse formats to a unified personal playlist.

Next, I asked what sort of activities are performed while listening to music. Again, the spread was pretty even. In the “other” category I was expecting to see commuting, however this could have been lumped in with exercise or driving depending on personal interpretation, and on the type of transit a person takes. 5 of the 16 responses in other were under the guise of “everything.” Only 1 of the 16 responses in the other category mentioned walking. These responses seem to reinforce individual music consumption while doing a task not meant for multiple people, like driving, doing housework or homework.

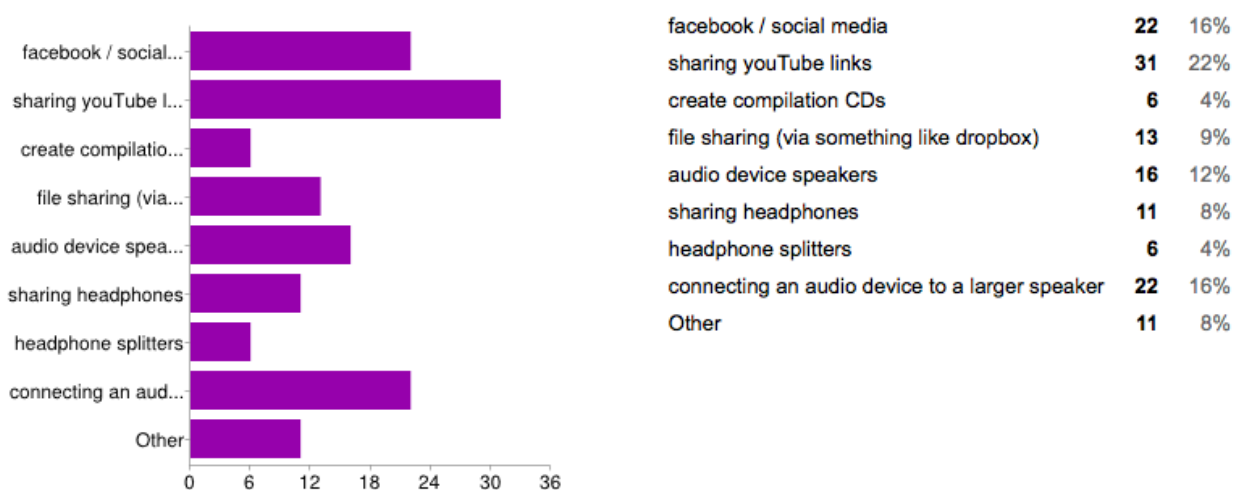
To try and find out if people do in fact listen to music together while performing a shared activity, the first thing I asked was what sort of activities do they perform with a friend. It was an open response, but there were three categories of activities that appeared over ten times each in response: sport and exercise, dining, and hanging out. The first category is easy to address, and can be considered a prime activity for Roaming DJ. The other two responses are hard to cater music to. The follow up question asked whether or not they listened to music while performing the activities they listed.

Do you listen to music while you perform your previous response's activity?



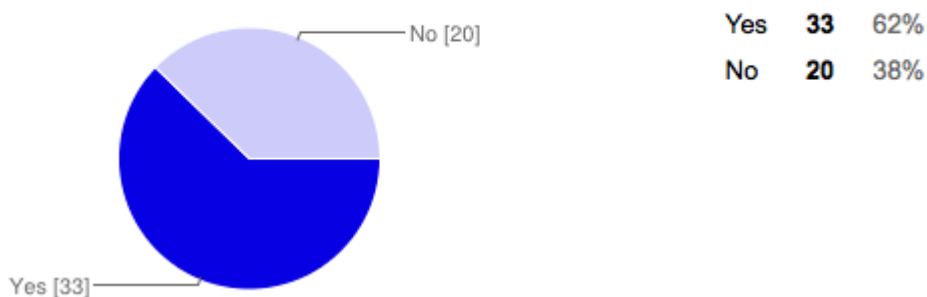
About one third of people do listen to music. When prompted “Why or why not?” Respondents reasons ranged from interest in learning about a friend’s music preferences, regulating mood to a few claiming that “background silence is unnerving.” One respondent noted that she listens to music in a park with friends and that she does so “as long as it isn’t intrusive to others.” This is another good example of a possible Roaming DJ use case. As for the people that responded no, the activities they performed were not conducive to personalized music listening; it involved watching television or movies, or activities like going out to bars where there is already music present.

How do you typically share music with others?



The final question of this section asks how respondents went about sharing music with their friends. This offers some insight as to how sharing music with one another currently exists. It appears that the standard for sharing music internet is in a combination of sharing via Facebook and copying and pasting YouTube links. There is ample room for Roaming DJ to improve this mode of sharing.

Would you feel comfortable allowing strangers to listen to your personal music collection with you in a public area through a mobile application?



The last section of the survey were questions directly related to Roaming DJ. The first question I asked was about strangers sharing music with each other. I wanted to see if people were open to the idea of allowing someone they didn't know to connect to their music playlist. A little less than one third said they would not be open to the idea. The follow up question in this section and the last question on the survey, directly asked "If there was an mobile app that would let you wirelessly sync up music on your device

to others would you use it?” Respondents that weren’t open to this notion generally had no need to use such an application. One respondent voiced a desire to snoop on other people, but a concern about connecting to their own music for fear of ridicule. Respondents that were open to the idea were a mix between people that would use the application for sharing with only people they know, people who would use the application for music discovery, and a mixture of the two. It is in this data that a user taxonomy emerged.

Comparing the design guidelines to the survey it was clear that I had accounted for the different types of users in my design guidelines. A trichotomy of users would emerge:

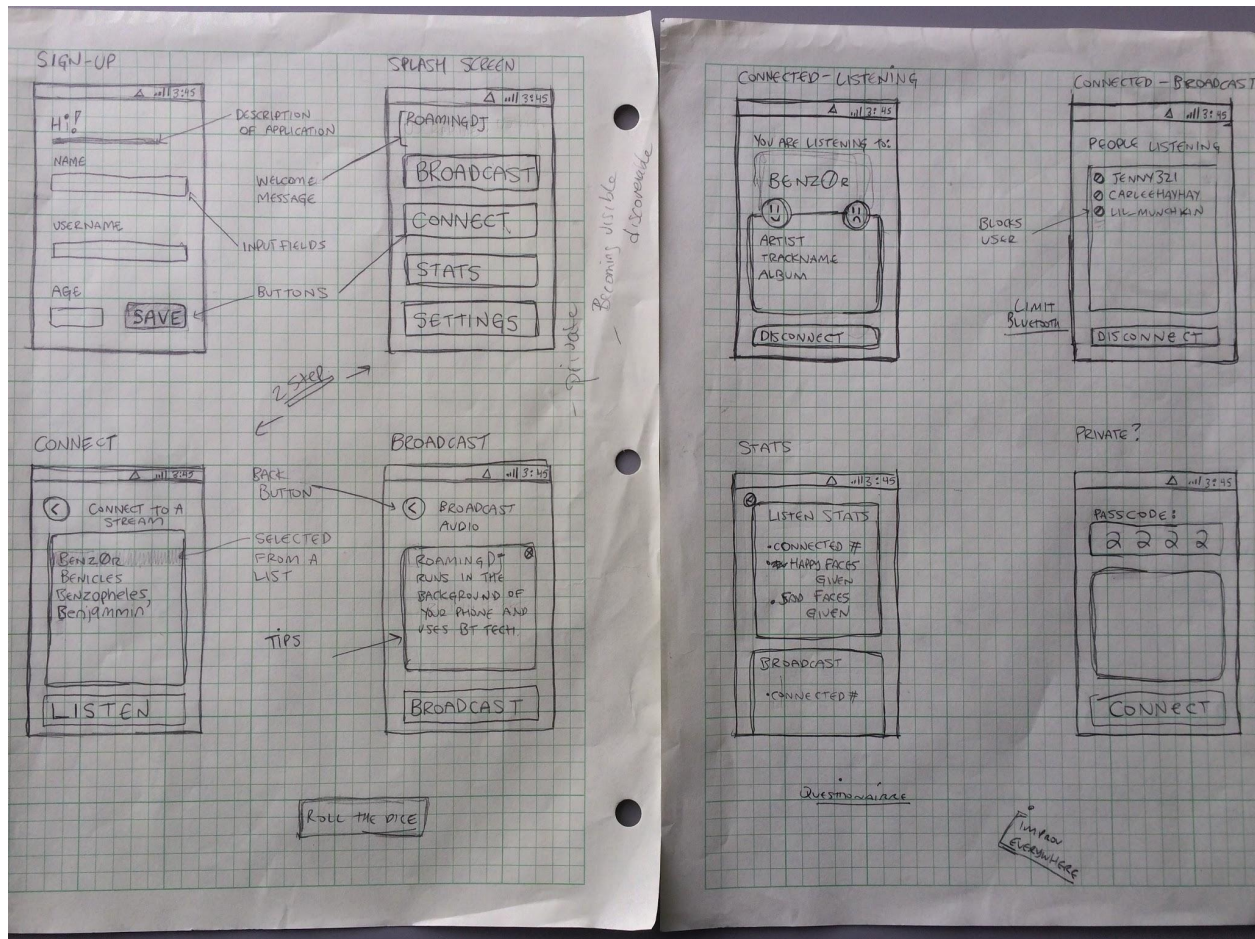
- Users that want to only share music with their friends
- Users that want to explore music by strangers in proximity
- Users that want to do a combination of exploring music and sharing with their friends

Approach

Initially, Roaming DJ was designed to be a stand-alone native Android application. The transfer speed of Bluetooth in particular through a paired connection is able to provide a solid instantaneous connection for audio transmission, so initial buffering should not be an issue. Peer-to-peer direct wifi is also a technology available in new Android devices that is great for making small proximity connections to other people. Being able to control connections on a hardware level means better connections and control over audio. It would be possible for this application to run in the background, issue events to the phone, and play audio from the various applications and media already on a person's phone. On top of the application, Roaming DJ would have also identified how users apply it to their lives by recording data to a database connected and displayed on a website. From there, I could monitor the usage as to what types of audio media are passed through the application, and where the connection occurs. Additionally, the game stats would also be recorded and visible on the website. The game stats would be made public, but logistical information like geolocation would be hidden. Ideally, the plan made in the document proposal was to complete the application and website in the Fall term, and the user testing and iteration could begin in January.

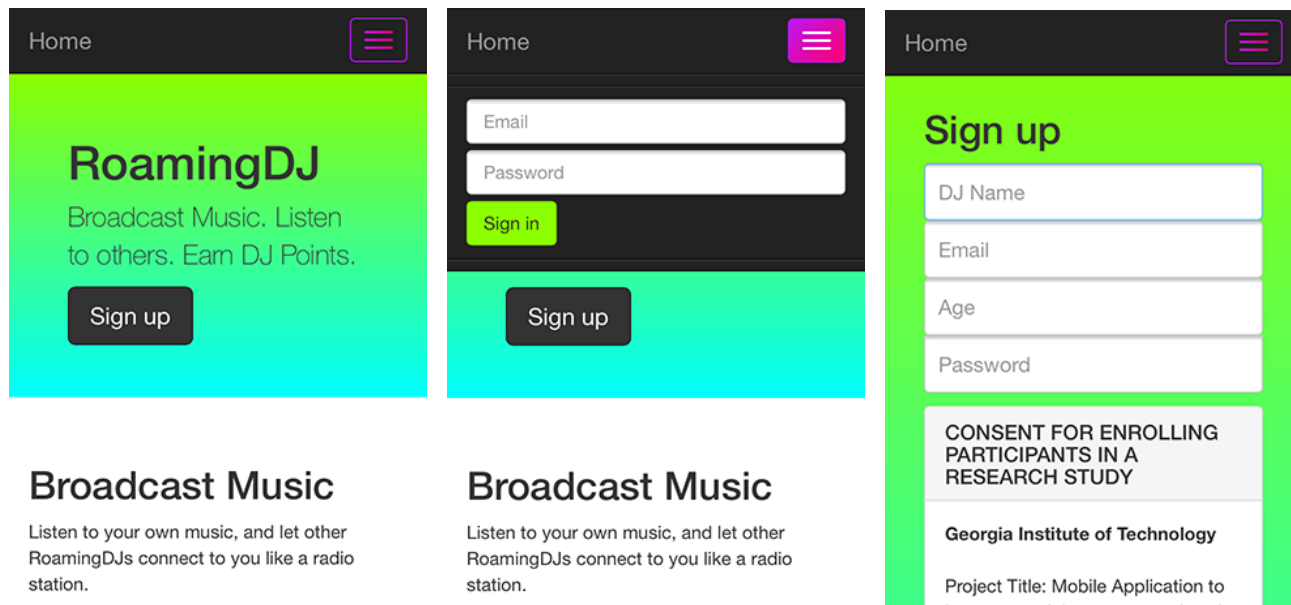
I took several approaches between Bluetooth, Android's p2p direct wifi, and using wireless Internet. Eventually, I came to the conclusion to switch technologies. This would allow me to break away from the Android platform and be able to test in multiple environments. I switched to HTML5, CSS3, PHP, and JavaScript and other web technologies. Using the web as a platform potentially opens up usage for other devices and laptops to allow a more diverse range of users.

Initially, I constructed sketchpad wireframes to work off of for the Android application.

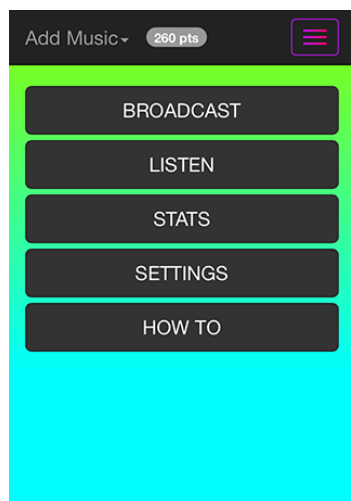


These wireframes would also act as a baseline for the new web-based application. I deployed a few pre-constructed modules in my design to accelerate the development process. The first of which was a responsive grid-layout style system called [Bootstrap](#). Bootstrap is a web framework created by Twitter that allows websites to be structured quickly and is device responsive, meaning it will adjust the website's display grid according to the type of screen a user has. The second module I deployed was a web media player called [HTML5 Audio Player with Playlist](#). This particular player afforded use of multiple different kinds of media, such as podcasts, SoundClouds, mp3s, YouTube videos, among others. Using these two modules enabled me to focus on the more rigorous coding required by the application.

Designing the Project

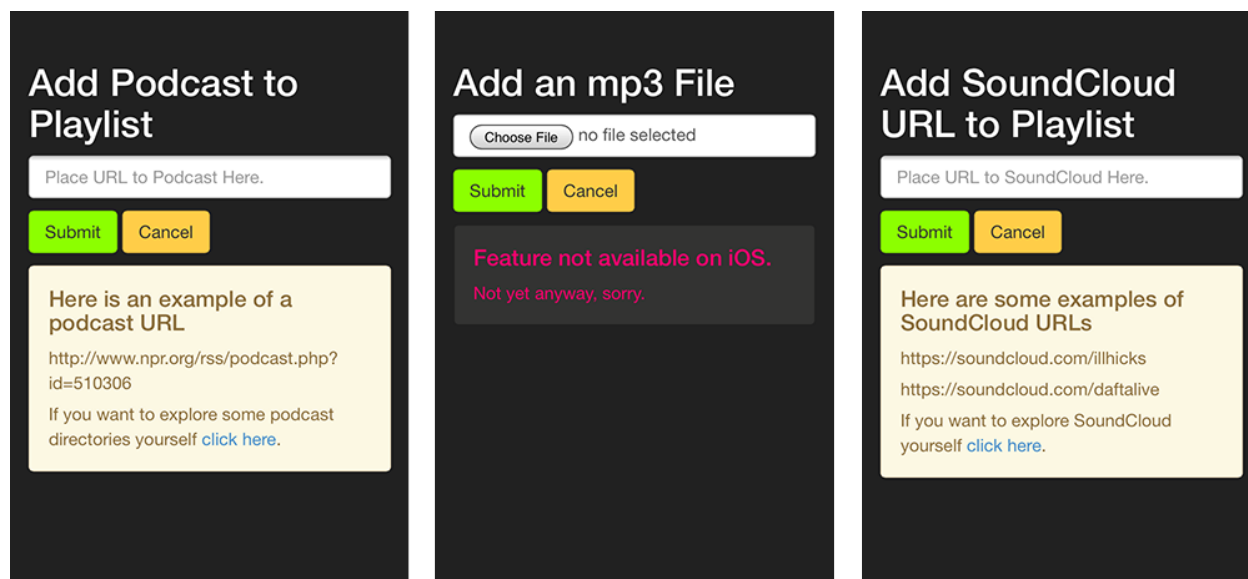


Above are the index, sign up and sign in pages. The index page (above on the left) is the page a user would reach on first access. A user can read about the basic functionality of Roaming DJ and choose to sign in or sign up. If users want to sign in they can click the top right navigation and have a dropdown for login credentials (middle). If a user needs to sign up they can hit the Sign up button to be taken to the registration screen (above on the right). Here, the user enters a DJ Name they wish to go by in the system, as well as their email, age and a password. At the bottom, users can opt in to the research. If they don't opt in, they will not be recorded in the research.

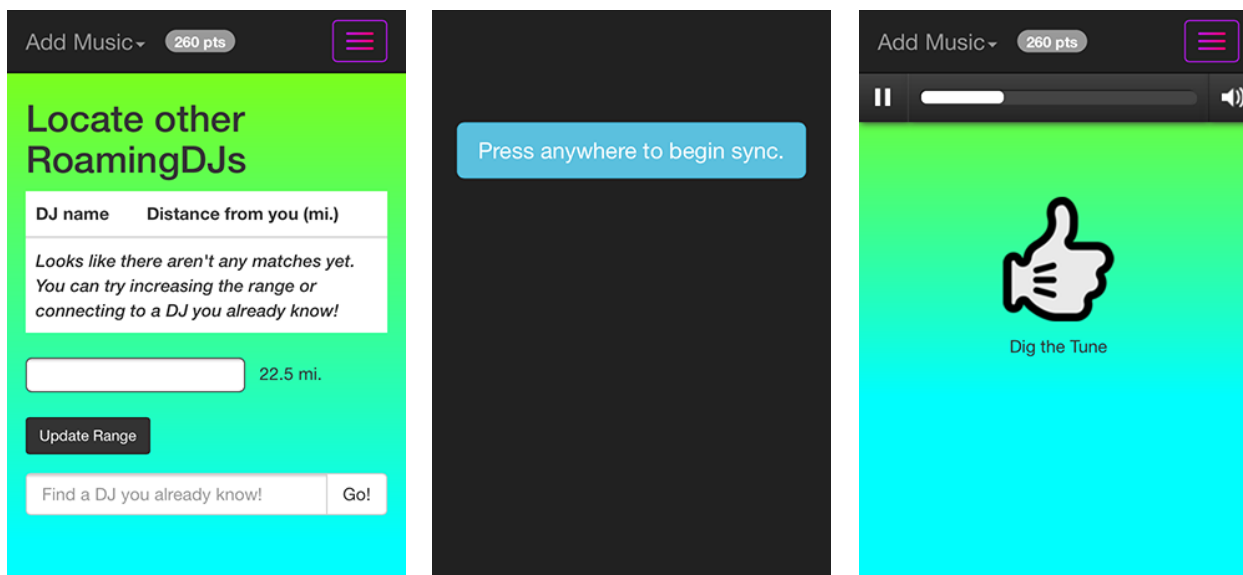


After logging in, users are brought to this screen (left) where they have five options to choose from. The main navigation consists of allowing users to broadcast their own music, listen to other people's broadcast, check their usage statistics, edit their settings, or find out more about how to use the application. A sub navigation item that appears across all screens of the application is the Add music panel. From there, users are able to

add music to their broadcast playlist. The points are also displayed across all screens and link directly to the statistics page.

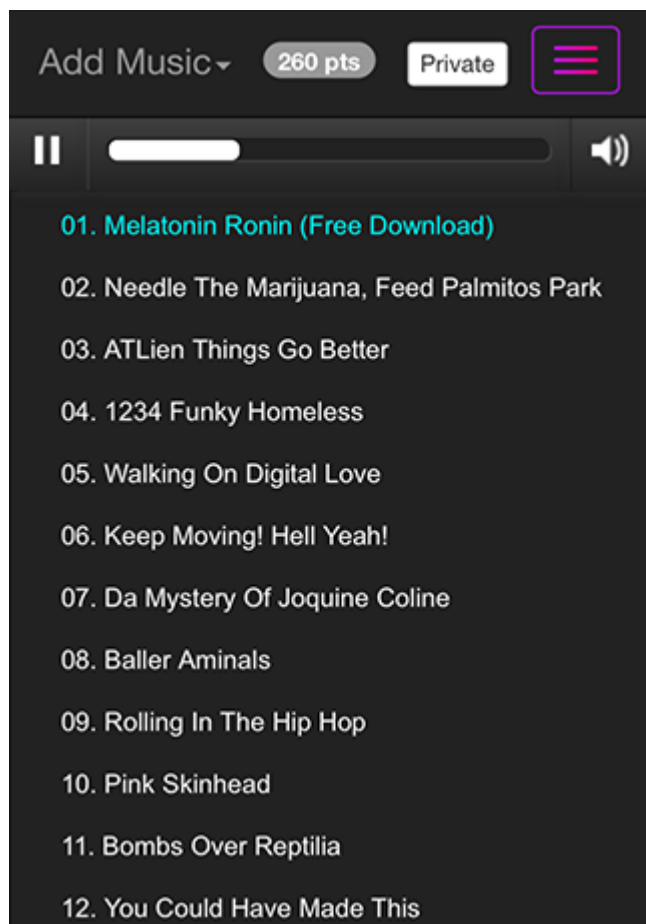


There are three different ways users are able to add music to their playlist, which are as follows: adding a podcast url, adding a SoundCloud url, and uploading an mp3 file. There are directions and suggestions under each form to help guide the user. If a user chooses to add a podcast url or a SoundCloud url to their playlist, the url will be added to an XML playlist that the music player reads to propagate music. Typically, the podcast is an RSS feed and will have a list of several podcasts. In this case, the XML playlist and music player account for the multiple items and adds them in succession in the music player. The same happens with SoundCloud urls. If there are multiple songs listed the player will understand and add the first ten items in the list. For mp3s, the files are uploaded to a folder on the server and then linked to the XML playlist for listening. By enabling access to audio content in a variety of formats, it offers a wider variety in defining suitable playlists and styles. While there were more ways to add music from the API of the player, this application focuses on the three that provide the most accessibility for users across multiple devices.



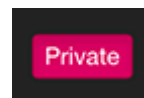
Listening to other DJs in your area is simple. By clicking *Listen* in the navigation, the application will open the page that locates other Roaming DJs (left). The screen will ask users for permission to connect to their geolocation information. Once successful the page will refresh every 15 seconds scanning for users broadcasting music by checking a MySQL database to see if any users have come online to broadcast. Users are able to change the range with a slider underneath. The range for the distance scale is from 0.5 miles to 22.5 miles. Ideally this range would be shorter but for the purpose of testing it's important to find at least one connection. If users want to join a private broadcasting session they can enter the name of the DJ they wish to connect to. Since the main purposes of the application are to explore music from strangers, build social capital, and change non-places into places, it is important to include this proximal step to identify users in the immediate area.

After the user selection is made they will be asked to press anywhere on the screen (middle). The reason for adding this page is because current iOS and mobile standards disable autoplay for music on websites. Forcing an interaction from the user will trigger the listen player. At this point the screen will have connected to the database once again and read the track number and timestamp of the song being broadcasted and put it in the queue of the player. Once a user is connected and listening users are able to “Dig the Tune” and give the broadcaster DJ and themselves points for songs.

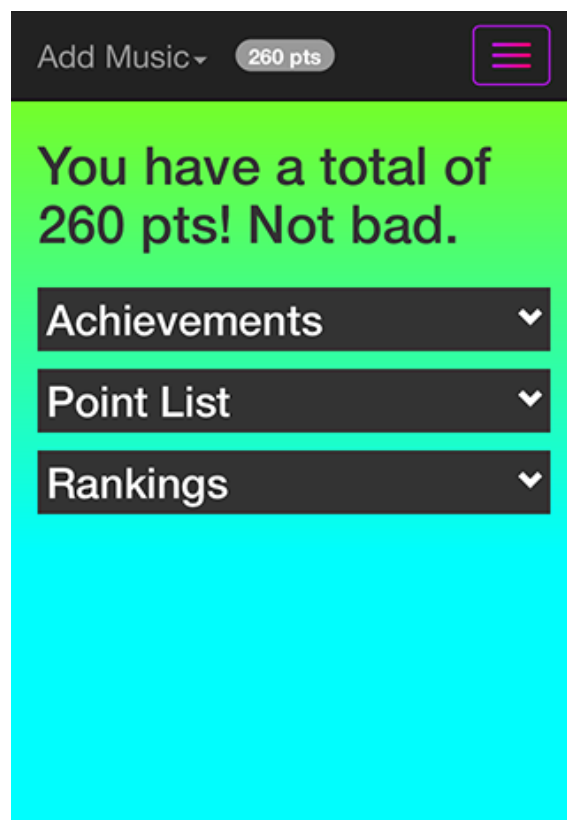
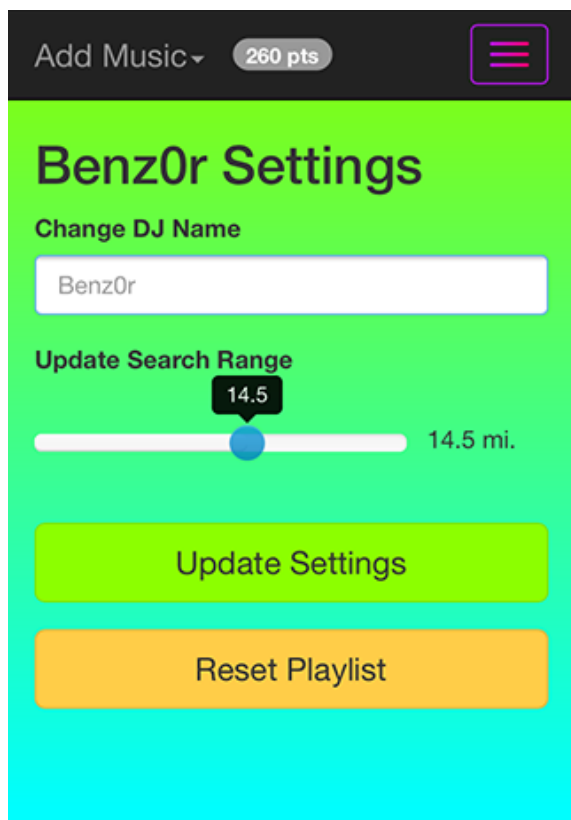


The *Broadcast* screen (left) is where users can listen to their own music or go to share their music with others. They are given the option to select songs from their playlist and listen to them, create a private session or, like the other screens, add music on the fly. To make a selection, users are able to just tap on the song they wish to play. Since some will want to share only with their existing friends, or only want to share what they are listening to sometimes, they are able to create a private session. To create a private session users will have to tap on the private icon in the navigation. Once activated the button will turn red in color. While on this screen, a script is running that updates a MySQL database every three seconds, sending information

about whether the device is broadcasting, the track number, the timestamp of the song, and the user's geolocation. When a listener wants to connect, the broadcaster is able to be located by others and synced. While the database information is only uploaded every three seconds; there is a configuration in place that assumes a latency and appropriately adjusts the timing. Broadcasting music is one of the ways that points can be earned.



If users are interested in adjusting settings, they can do so on the *Settings* screen. There, they are able to reset their music playlist, add music like on the other pages, adjust their default geographic range setting via the slider, and also change their DJ Name. If they are not opted into the research they can also opt in on the settings screen.



To view accomplishments such as achievement badges earned, to track how a user has earned their own points, and view how they stack against others they can go to the *Stats* screen (top right). The numbers are propagated from a database on the server that tracks user performance and assigns points based on such variables as connections or number of times a tune is “dug”. The point listings show how many points were earned, how the points were earned, and when the points were earned. The rankings are created the same way since totals and DJ names can be calculated from tables in the database. These sections are separated in accordion style drop down menus.

The final screen in the Roaming DJ application is the *How To* screen which includes directions about basic usage, functionality, and anticipated future developments to the application. The sections are also organized in accordion style drop down menus for legibility.

Participation, Iteration and the User Test

Instead of trying to anticipate what future users will expect from an application like Roaming DJ, an important step in my process for determining user needs was to poll users directly. This participatory process also was intended to gauge how social capital and environment can be impacted by Roaming DJ. By asking testers how they would improve the project at the end of a testing period, and by allowing testers to be involved in the design process, I was able to gain more insight into the ways in which the application was used, thus informing the design of the future versions.

I recruited testers the same way I recruited respondents: online. I declined to ask any questions that could identify a tester during their usage. The testers were free to use the application as they wished during the trial period of three weeks. Afterwards, I divided up the list of users in two groups. The first group were users who signed up and didn't gain any points, which meant they didn't use the application. The second group was comprised of users who earned points. I sent out an email to the addresses within my database that matched the second group's profile and referred them to a survey link.

The follow-up survey consisted of two parts. The first part contained questions about usage patterns, perceived benefits, and whether Roaming DJ had resulted in any types of experiences that might have produced a changed flow state or an alteration of the perception of their environment.

- Where did you use the application?
- Did Roaming DJ build any associations with the environment?
- If you used the application with someone you knew, did you feel more connected to them during your usage?
- If you used the application with someone you did not know, where did you connect with them? What was the experience?
- Did you perform any physical activities while using the application? Did you perform better?

The first question focused on venue. The second question was about perceived relationships with the environment. Of the six respondents, four used the application in places already familiar to them citing “home”, and two used the application in public spaces: walking to class and at the gym. Those public locations are choice venues for Roaming DJ to be transformative to the environment. The tester who went to the gym responded negatively to the question about new associations with the environment being formed. The tester who walked to class said “A little bit.” ... “as I reach the first street light corner, I usually associate this spot with where I begin to use the application”. This insight articulates that Roaming DJ can be successful in altering the perception of one’s environment and in changing a non-place into a place.

The next questions from this section in the survey asked the respondents if they used the application with someone they knew, and if they formed a bond through the experience. All six said they used the application with someone they knew, but two thirds of that sample said that it had helped form a greater bond with that person. One tester said “I do (feel more connected) because I can then talk to that person later and have a more intimate discussion on our perspectives about each others music choices.” This experience demonstrates Roaming DJ’s potential to alter the environment, and enhance the participant’s social capital.

The following question in the survey asked if they had used the application with someone they didn’t know. No testers reported using the application with a stranger. From my observations of the database I could see the amount of people in the testing pool that were active, and I realized that the small sample size was not conducive to attract strangers. There simply weren’t enough people using the application during this test. Because the geolocation aspect functions properly, as the universe of users expands so too should the likelihood for proximate strangers to interact.

The final question from this section of the survey asked the users if they performed any physical activities while using the application and if they experienced an increase in performance. All the testers reported performing their activities better. This can be related to Csikszentmihalyi’s work about how music can create flow states.¹¹

¹¹Csikszentmihalyi, M. (1997). *Finding Flow*. 29

The second part of the survey asked if the users had encountered any performance issues, how they think Roaming DJ might fit into current trends in the market, and any ideas they might have involving the next stage in development.

- Could you see Roaming DJ performing better as a stand alone product or as part of an existing product or service? Why?
- Did you encounter any errors or bugs while using Roaming DJ?
- Do you have any suggestions that would improve the Roaming DJ application?

As indicated, all of these questions were open-ended as a way to solicit the most detailed responses.

This part asked questions that could help improve the application, spot bugs, and establish Roaming DJ in the market. The first question of this section asked if Roaming DJ would perform better as a stand alone product or existing as a feature in an existing product. I was curious to hear about this response because I felt that the toughest part of the Roaming DJ application for users was to add their own music to the player. One tester said “I do believe grouping up with say an application like Spotify, then the user would have a larger music choice to choose from to play without relying on their actual phone's music.” If Roaming DJ was attached to an existing service like Spotify the music selection is already the flagship of the product and it would be easy to gain a large user base quickly. If Roaming DJ was a stand alone application users will have more control over their music.

In addition to having testers use Roaming DJ and provide feedback, I wanted to continue rolling out iterations of the project in parallel. Because of this, I asked if any testers had experienced anything that was bugged or felt broken. One user reported not remembering their password and had to create a new account. Another said the connectivity could be spotty.

A major step forward while testing the application was transitioning to a websocket platform. Websockets allow for event-driven responses that don't require connecting a

web client (where the user is) to a server. The specific platforms of technology that can accomplish this task are [node.js](#) and [socket.io](#). This eliminates the lag caused by writing to a database and pulling information from it. The system I originally crafted used intervals of time to check a database and see if there was a change. If there was a desired change then the system would execute the code in waiting. This new websocket system creates instantaneous communication between two separate pages, a technique useful for syncing events like HTML5 audio.

The final question in the survey asked for any suggestions that a tester might have to better the product or get more people to use it. This particular question gave me a lot of insight as to what users might expect or want in the future. One tester wanted to see a round-robin queue system implemented. While this system can be useful in communal settings like parties, Roaming DJ is a better platform for discovering other's music in a style akin to that of flipping through radio stations. Another tester introduced a personalization aspect to the application. He said,

“If there was some way to project who I am to others. I like the boombox icon and I think it would be really cool if I could build some type of boombox in the system, based off of completing actions in the system. I think I would even be willing to buy parts if they were cheap enough (like 99 cents). You could imagine a cool boombox avatar that represent who you are that you could show off to others.[sic]”

This is a good idea and it offers valuable insight as to me as the designer and developer of the application. By creating a micro economy personalization aspect, this can help motivate users to explore the product more deeply and create the competition that the current point system is lacking. Users would be able to exchange their points for skins and avatars to trick out their listening page. Instead of a giant thumbs up, listeners would see the broadcaster's personalized boombox.

Conclusion

In retrospect, from an execution standpoint the programming requirements turned out to be greater than initially anticipated. Since a lot more time was spent in the development portion of the timeline, it shortened the time available to gather user input, insight, and make all of the recommended design modifications.

The small sample size notwithstanding, it's clear that some of the hypothesized benefits turned out to be valid. Roaming DJ did contribute positively to the pursuit of shared objectives and in the conversion of non-places to places. As I'm able to increase the sample size in the future, I hope to investigate the application's ability to facilitate interactions between strangers, and the gamification protocol and benefits. Future iterations of Roaming DJ could include a more robust scoring system, ways to enable strangers to identify one another if they want to, and the creation of a micro economy for personalization. Moving forward, I could see this type of technology being implemented into some of the popular music applications today.

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