

Location33: A Mobile Musical

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ABSTRACT

In this paper, we describe a course of research investigating the potential for new types of music made possible by location tracking and wireless technologies. Listeners walk around downtown Culver City, California and explore a new type of musical album by mixing together songs and stories based on their movement. By using mobile devices as an interface, we can create new types of musical experiences that allow listeners to take a more interactive approach to an album.

Keywords

Mobile Music, Digital Soundscape, Location-Based Entertainment, Mobility, Interactive Music, Augmented Reality

1. INTRODUCTION

Digital music technologies in the past few years have slowly begun to dissolve many of the defining characteristics of the traditional music album. Audio compression techniques and increasing data transfer speeds have started eating away at the established distribution model for music. Online stores like iTunes charge by song, not by a full album, and others such as the new Napster, view music as something you subscribe to rather than own. Musicians can also easily publish their music on the web, without having to navigate through the record deal process, allowing them to release music in whatever form they want. While the music industry still functions around the idea of the traditional album, these trends are creating an environment where new types of music can bubble up. Drawing on the recent success of digital mobile players like the iPod, and the rapid proliferation of mobile phones, location33 looks to develop and alter the conception of the album by putting it into a mobile space—into the context of the physical environment.

2. PRIOR ART

Paul Milgram, et al. defined a Reality-Virtually (RV) continuum as a way to define how new technologies could form new types of realities [1]. Scott Fisher's work at Keio University expanded upon the idea of this RV continuum, and developed a model for authoring media content linked to

physical locations [2].

Much of the current research into mobile music lies towards the "real" part of this Reality-Virtuality Continuum, augmenting our perception of the real world with virtual – in this case musical – data. Oversampling, INC. produced Soundwalk NYC as a guide to all the hot spots in New York [3]. Many projects have followed similar "guide" models, using voice to manifest certain aspects of the environment to the listener. Other projects, such as Future Applications Labs' Sonic City allowed users to create electronic music through their interactions with the environment as determined by a large array of environmental sensors [4]. Sonic City was an abstract way of bringing urban physical space into the consciousness of the listener, augmenting the environment with music. Joey Rozier and Karrie Karahalios's Hear&There project, developed at MIT Media Lab allowed users to create SoundSpots at real world locations that were then accessed with a location-aware mobile sculpture [5]. Teri Rueb's installation Drift placed audio on the beach by using a GPS (Global Positioning Satellite) enabled system to playback audio depending on a listener's position relative to the undulating tides [6]. The artist Janet Cardiff was known for her "walks" which led listeners on headphone tours of unique places [7]. These projects all make great strides towards augmenting our perception of physical space with music, therefore tending towards the "real" in Milgram's RV continuum.

However, there are fewer projects that move closer towards the virtual part of that continuum. Projects such as 34 N. 118 W., which maps turn of the century Los Angeles to the present day Downtown area [8], and Botfighters, which makes physical space into a game world accessed through a mobile phone [9], are examples of projects exploring the potential for mobile media to create new, more virtual worlds that still engage the physical environment. Similarly, Atau Tanaka's Malleable Mobile Music suggested a new type of mobile music making that was based more on movement and collaboration than on the perceptual augmentation of a physical space [10].

We put our headphones on when we listen to our iPods for a reason – we want to enter the musical worlds created by songs and albums. Location33 is an attempt to rethink the way that recorded music and songs can be created in the context of mobile music. In addition, this research tries to reconcile musical virtual worlds with the real world, building a space where listeners can easily drift between the real and the virtual. Songs and albums have been around for over a century, yet only now are new digital technologies allowing these mediums to be explored in greater depth. Redefining the idea of a song as a collection of many discrete parts and layering those fragments onto a space allows the listener becomes an active participant in the album. By using the old folk music device of the story song, location33 attempts to create a

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compelling virtual fiction that motivates listeners to simultaneously explore the physical and virtual world.

3. PROJECT DESCRIPTION

3.1 Goals

The goal of location33 is to create a unique type of musical album, one that merges the traditional model of the song cycle with interactive narrative, location awareness, and game play. Equipped with a GPS enabled PDA or mobile phone, players can walk through downtown Culver City, California and, through the paths they take, mix together an album and the story that the music tells.

3.2 Authoring For Space And Time

Throughout the Culver City area, there are twenty nodes, which act as portals into the world of the album. Each of these nodes is linked with a fragment of a song – such as a verse or a chorus – and when a player approaches one of the portals the correct music file is streamed to their device.

While the portals – the physical space of the album – are fixed, the musical space is not static. The relationship between node and corresponding musical fragment changes over time, modulating over the course of one week. Since the album is authored over seven days, there are myriad possible permutations. The album is offered in such a way so as to be persistent over the course of one week, before it loops, offering players the sense that they are not only listening to an album, but are entering and impacting an entire world. In the traditional model of music consumption, albums are bought and then listened to in terms dictated by the producer. The line of consumption follows the traditional one-way producer to consumer model. With location33, the album is presented as an entire universe that is moving and shifting over time, a world that invites the listener in and allows them to assume a more active listening role.

3.3 An Album in Space and Time

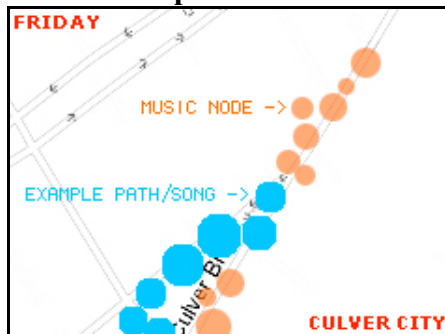


Figure 1 – Path as a Song

Location33 aims to create new models for how the traditional notions of songs and albums are formed. The typical song delineates a boundary that acts to separate itself from other musical themes and ideas. The album can be a way that these discrete musical or thematic ideas can be unified into a larger composition. Location33 uses these fundamental concepts, but expands them to take advantage of a mobile interface. Each day a specific song is active. This song is composed of many distinct fragments, each representing a verse, a chorus, or a bridge. As a player walks around the space, they piece together these fragments, and begin to develop the sense of

their path being a song. Paths create songs (figure 1). Each day of the week yields a different song, and all of the components for each day are composed within the limits of a singular musical idea or theme. The album is generated over the course of the week. The songs the player mixes each day all add to an overall composition. The week therefore constitutes the album.

3.4 Story Songs And Interactive Narrative

Stories also play heavily in the compositional element of location33. The world of the album is not only a musical one, but also one that relies heavily on the traditions of musical storytelling exemplified by folk songs and musicals. In addition to focusing on a musical theme each day, the album also focuses on a particular story element, which is sung by one of the three characters, Mack, Mackbot, or the Narrator. These characters inhabit the space of the album, and sing the songs that compose the overall narrative that runs throughout. It is up to the player to discover these musical story fragments and piece them together to form a cohesive story. In the narrative, songs tell individual stories, while the album – the collection of songs – creates the world of the narrative.

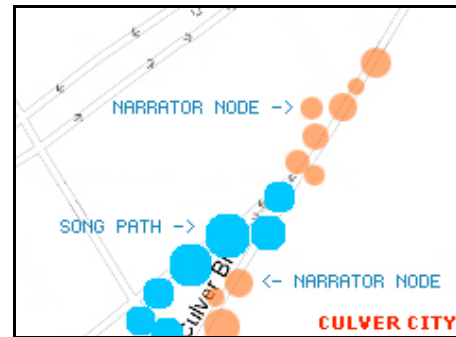


Figure 2 – Narrator Nodes in Space

While the narrative elements of the album unfold – as sung by the Mack and Mackbot characters – the player is also introduced to the narrator, a modern day troubadour (figure 2). The Narrator's main purpose is to contextualize the album within the setting of Culver City and to provide the player with helpful hints and instructions. Culver City is the home of two major movie studios, and is the location where the Metro-Goldwyn-Mayer studio produced its famous musicals in the 1920s and 1930s. The narrator sings about pieces of Culver City's history, acknowledging the physical environment while at the same time setting the stage for the musical fiction that lies in the virtual song layer. The best metaphor is that Culver City is the set upon which the album takes place, similar to the way movies are set in various locales.

3.5 Unlocking the Castle

In addition to using the elements of traditional musical structures and narrative constructs, location33 also adds elements of game play, further augmenting the listener's role as an active participant in the album. The first game play element—discovery—is inherent to the structure of the album. The player is asked to move around the space to find story fragments in a type of musical and narrative scavenger hunt. In addition, the narrator character will give the player hints and clues to puzzles that can help aid navigation through the

story elements, or unlock audio files that the player can access from a desktop machine to keep as an artifact of the experience.

The player is also able to interact and alter the temporal structure of the album. Using their phone or PDA, they can perform time travel operations that can enable them to experience the entire album without having to be in Culver City on each day of the week. This function can also allow users to replay certain paths as they are walking around. For example, if a player really enjoys a certain path they walked, they can travel to that same time any day of the week and re-experience the song they created.

In location33, Culver City becomes a turntable, inviting players to interface with a new type of musical album, an album that puts them in control of the musical structure, and offers them new forms of interaction and ways of becoming an active part of the music.

4. USER SCENARIO

4.1 GPS/PDA Scenario

Players start in Culver City’s downtown area and open the location33 application after connecting to the Culver City Wireless Network. When the application is launched, a brief introductory message is streamed locally from the PDA. After the message finishes playing, the player begins listening to an audio stream based on their current location, the day of the week, and the time of day. They look at a custom made physical map of Culver City, and note the location of all twenty nodes. They begin moving, listening to the current stream of audio – a fragment of a song. They move to the next closest node and the audio stream switches to a different song fragment, one that continues where the other verse left off. They continue down the path this way, listening to a song about the golden era of the MGM musical, each location adding a different piece to the song. After entering one node, the player hears a song in a different voice. The song being sung informs the player that there is another story that begins in their current location the next day. Using the interface on the PDA, the player selects the next day, at the same time, from a drop down menu. The audio stream immediately switches from the current audio file to another musical fragment. Following their map, the player continues walking around the space, beginning to piece together a new song.

4.2 Mobile Version

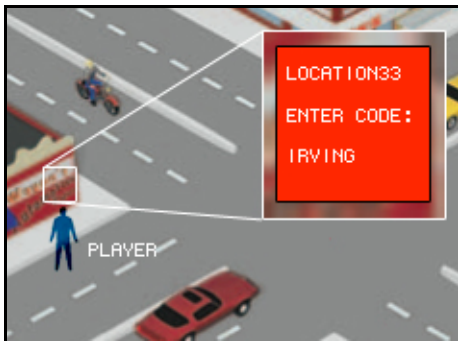


Figure 3 – Mobile Codes Embedded in Physical space

The mobile phone version of location33 begins in a different way. Players dial a number they are given on a physical map. The number connects to the voice of the narrator, who sings

the expository verse, and prompts the user to walk around the city looking for codes. If they want to travel in time, the narrator sings, simply say “travel.” Using the map as a guide, the player wanders around downtown until they see a sticker positioned in the middle of a node (figure 3). The sticker displays a code. The player then speaks that into the mobile phone, an audio file begins playing based on the same structure as described in the GPS/PDA version of the project.

The player begins walking towards a new node. Before they reach the new node the song fragments ends, and begins a loop. Reaching the next code, they speak the text into the phone, which promptly fades out the current audio file and fades into a new one. The player wanders around for a few more minutes, entering new codes and beginning to develop a sense of the album and the story. They then speak “travel” into the device, and they are presented with a voice form asking them to choose a day and time to travel to. The player speaks the time they want to jump to, and they are now listening to a virtual song layer that exists in the future.

4.3 Artifact

While walking around Culver City, a player may hear the narrator sing a verse about hints and clues scattered throughout the space. After returning home, the player can register and login with the location33 website, and enter codes based on musical clues embedded in the virtual song layer. When the player enters a given clue, they will unlock a corresponding mp3 file. For example, piecing together all of the names of the movie studios in Culver City will yield an artifact, an mp3 file of the song about the history of the downtown Studios. This aspect of the experience introduces an element of simple game play to the space.

5. Implementation

To allow for an increased number of players, the system was implemented using two different technological platforms, the GPS enabled PDA and a standard mobile phone.

5.1 GPS/PDA

The main version of location33 is a Pocket PC application that runs on a HP iPaq PDA. When the location33 application is run, the PDA connects to the location33 server and receives the most recent data file that encapsulates all of the location-specific data, the GPS coordinates and their corresponding audio file names (figure 4).

Lat.	Long.	Day	Time	File
34.xx	118.xx	3	2	32.wav
The Following Row would play the file 32.wav on Sunday between 12PM and 6PM				

Figure 4 – Example table row

As the player begins walking around, their position is tracked using a GPS device. The system performs smoothing functions on the incoming GPS data, and will then check the smoothed coordinates against the data table. Each row in the data table consists of a value of latitude, longitude, day of the

week, time of day, and audio file name (figure 5). If there is a match, the client will request the corresponding music file from the server, which will begin the audio streaming. If there is no match, the PDA will locally stream a stored ambient music track. If the application does not receive GPS coordinates due to being outside of the line of sight of the GPS satellites, or if the device is no longer connected to the wireless internet, the application will locally stream an musical error message. The Wireless Network in Culver City consists of a Firetide wireless mesh network consisting of three HotPoint@1000R outdoor mesh routers. The wireless gateway device is connected to a 3-Mbit/s DSL line.

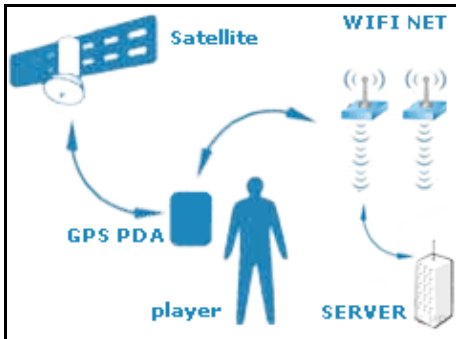


Figure 5 – GPS / PDA Data Flow

5.2 Mobile Phone

The phone version is designed to run using only voice commands so that any player with a mobile phone can participate. The player dials a phone number, which connects to a Bevocal host server. The Bevocal host requests VoiceXML files from the location33 server, which control the voice forms and voice recognition the player will use to navigate the space (figure 6). When the player speaks a code, the Bevocal host performs voice recognition, and checks the spoken code against an array of node latitude and longitude points.

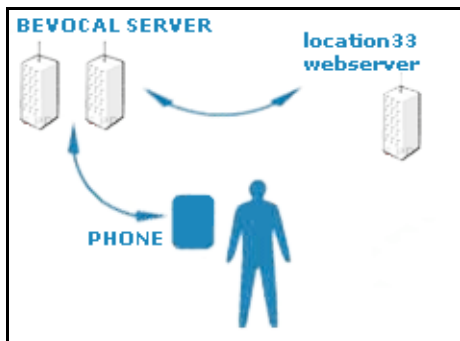


Figure 6 – Mobile Phone Data Flow

If the player speaks a correct code, the system assumes that they are at the physical location of the node. Once the location of the player has been extrapolated from the code, the system uses php functions to check the current server time. The audio file corresponding to the player's current node, the day of the week, and the time of day, is then extracted from a mysql database.

When a player is listening to an audio file and they speak a new code, the system calls a generic “fade out” audio file followed immediately by a “fade in” audio file, therefore smoothly transitioning to the next song fragment. Audio files are cached for a long period of time on the Bevocal server to limit potential delays in the initial playback of the music files. To travel in time, the system recognizes the command “travel” and bypasses the current server time according to the day of week and time selected by the player via a VoiceXML form.

6. Conclusions and Future Work

Location33 is an example of one new type of musical system that is made possible through the development of mobile technology. By using movement and interactivity as a means for navigation through a collection of songs, location33 tries to reinvent the traditional musical album and make it a more interactive experience.

7. ACKNOWLEDGMENTS

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