undersound and the Above Ground

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ABSTRACT

This paper presents the design of a mobile music sharing application, *undersound*, targeted towards the London Underground, explores the design and implementation challenges, and suggests a small-scale experiment within a bar environment to test some of the technical and interactional aspects of the application.

Categories and Subject Descriptors

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Keywords

Mobile music, peer-to-peer, music sharing, situated design

1. INTRODUCTION

As the field of mobile music grows, the practice of sharing music from one portable device to the next is becoming more of an everyday reality (e.g. [7]). In turn, we will describe work we have been doing with a peer-to-peer music sharing system that runs on mobile phones. This work focuses on incorporating current technologies that have a wide penetration to try and reach a large audience. Further, we are attempting to allow the use of these technologies to remain firmly grounded in real world practices. Thus, our work is less experimental and more experiential. In this paper we will discuss one long-term design project that falls into this category, and propose a very new one which it has recently inspired.

2. UNDERSOUND

This section will describe our living experiences with designing and developing a mobile music sharing application geared toward a very high number of users in a widely distributed setting. This section intends to report both on the design itself, and on the practicalities faced when trying to create a highly-mobile and technically challenging system that does not require users to purchase new technology.

2.1 Design of *undersound*

With *undersound* we have sought to create a very situated design. We decided to focus on a culturally specific experience, the one of riding the London Underground, and design a system that could be integrated with such an experience. We approached the Underground both from a personal and experiential perspective and through an ethnographic study that included in-depth interviews and photographic documentation (see [2], [4]). The rational behind this was to understand different aspects of

traveling by 'Tube', and the relationships of individuals to one other, with technology and with the surrounding space.

undersound is a mobile music application that allows local unsigned musicians to upload Creative Commons copyrighted song at the Underground stations, and people to download and share the songs while traveling. Songs can be downloaded on mobile phones from the platforms and shared with other *undersound* users using Bluetooth (see Figure 1). Finally, passengers can see the results of the music itself 'traveling' through the Underground on public displays located within the stations where this information is displayed in a symbolic way. As the application is part of a EU-funded project called BIONETS, its implementation is currently being done within the scope of that project, which, as a whole, seeks to foster the development of a biologically-inspired wireless network.

We will now explain more about the design itself in connection to the predominant themes it is addressing: music-on-the-go, mnemonic places and social travelers.

Figure 1: Peer-to-peer music sharing in *undersound*

2.2 Music on-the-go

There are two distinct manners in which music is accessed and consumed within the Underground. On one hand, many people enter the space of the Tube with their portable music players and use them throughout their whole journeys. On the other hand, buskers play legally under the tunnels that connect different Underground lines, often entertaining, sometimes interacting with, and occasionally harassing, commuters while they walk from one side to another of the Underground network. *undersound* mirrors

both experiences in that it allows people to listen to their own music in private through their personal players, and allows musicians to distribute their music in specific parts of the Underground, like the buskers. In addition to this, *undersound* allows a bottom-up approach to music consumption, where songs are rated depending on how many times they are downloaded, shared and listened to. The application offers another way to distribute and consume music, and at the same time promotes Creative Commons practices, encouraging a share and share-alike approach. Finally, it offers to musicians a much wider diffusion of music than buskers can currently obtain, as listening is no longer confined to a singular temporal event occurring at a particular location. But, like the distinctive locations the buskers frequent, the fact that songs can be uploaded only once in the network allows for the creation of a strong link between music and place. Musicians are in fact only allowed to upload their songs once and they have therefore to choose a location for their music to be stored. The intention is that musicians would choose not only popular stations to upload their songs but also choose locations that are symbolic and meaningful to them, over time, allowing musical characters to emerge for the various stations.

2.3 Mnemonic Places

The upload limit is therefore meant to foster the creation of a stronger link between music and location. In his account of the commuting experience in the Paris Metro, Augé recalls how many of his personal memories are connected to specific stops of the Metro [1]; although not directly exposed to the overground, Underground stations are far from being quite similar locations spread around – or better under – the city. They are gateways to specific locations where people have lived experiences that often are recalled by the simple act of going through that station. The same way Bull noted how people using portable music players often create mnemonic narratives that combine music and location [5], we wanted to create a strong personal connection between the music that commuters download and listen to while traveling, and the locations they traverse while using the system.

In addition to this, *undersound* has been designed to increase people's awareness of their surroundings, especially in an environment where people are often passing by quickly to arrive as soon as possible to their destination. Because of the one-to-one relationship between songs and locations people can only obtain the songs either by finding them through others or going personally to the location. This can provide a motivation for people to explore not only new stations but also new locations within the city.

2.4 Social Travelers

Apart from fostering people's awareness of location, with *undersound* we also wanted to provide a tool that makes people interact, even subtly, with other co-located travelers. Through our ethnographic study we noted how people often listen to music or read newspapers and books to avoid social contact and to create a bubble around them, to cocoon [6] – to form a perceived private space within an overly-crowded public domain (see Figure 2). However, commuters are also often curious about each other and even express signs of socialization when they, for instance, leave their newspapers on the seat for other people to read after they have left the Tube. As newspapers in the Underground have become sort of 'common goods' and a means through which passengers acknowledge and subtly interact with one another,

undersound treats music as well as both a channel for interactions and as a common good that can be shared between commuters. Accordingly, *undersound* users can see on their mobile phones who else is in range and browse through their *undersound* music, with the opportunity to download songs or also to send messages to each other. We previously conducted research on mobile music sharing through a project called tunA which presented similar features to the peer-to-peer side of *undersound,* with the difference that in tunA users could only stream, in a synchronized way, music but not download the songs [3]. The Creative Commons license under which songs are registered within *undersound* allows music to not only be browsed but also freely shared.

Figure 2: Alone-together on the Underground

This interactional aspect of *undersound* does not force travelers to communicate with each other, but rather provides the opportunity to do so, or merely to discover new music through one another while traveling by Underground. Through the design we attempted, then, to strike a balance between allowing for moments of personal isolation but still accounting for, rather than imposing, times of socialization.

2.5 Implementing *undersound*

With an understanding of the design of *undersound* from the previous section, we will now turn to a discussion of the experience of implementing the project in this section. Because *undersound* is part of the larger BIONETS project, within the project itself, it is intended to act as a showcase for lower-level technical aspects. This means that it must run on a specific networking architecture and be developed as a modular service that can evolve with time. Because of these challenges, so far only a laptop version of the *undersound* demo has been implemented as a proof of concept for BIONETS. However, we are currently working on a version of the prototype that can run on mobile phones, which has been the original implementation plan for the design. In terms of evaluation, because *undersound* is an example of a situated design it would make sense to evaluate the application within the context it has been designed for, the London Underground.

It is, however, very challenging to gain permission to install an application such as *undersound*, as a research project, within the Tube. We have been in discussions with various members of

Transport for London about this opportunity, and have decided that once the full prototype is ready we will submit it as a proposal for the Platform for Art, a program that has shown increasing support for the presence of art installations within the Underground.

However, we have also been made aware of the difficulties that permanent installations in the Underground can pose – first, because of accessing things like power, but perhaps more importantly, because of security concerns. During the process of learning more about the real potential for such an installation, we realized that biggest hurdle would be the installation of permanent servers. Along with member of the BIONETS team, we then began to makes steps towards a completely mobile version of the system, which relied on giving Nokia N800s to station workers who could instead of acting as permanent station servers, at least be a more high-powered node. However, because *undersound* is only a small part of a much larger EU project, this initiative is not yet underway.

We have been eager, however, to test any part of our design in a real-world deployment. While PC-based tests work well for the exploring the technical challenges of the network, it is still difficult to gauge the interactional component of the design. In the next section we will report on the steps we have been taking to develop a similar project which takes its inspiration from *undersound*, but will be deployed in a much smaller-scale setting, and has as its aim to build and deploy a system we could test in the near future. Hopefully, this will allow us to prepare more effectively for the challenges of mounting a field trial in the Underground itself.

3. A BAR EXPERIMENT

Given the complexities of developing a new interface within the scope of a much broader project, we decided it might be advantageous to start by creating a much smaller-scale, yet still demo-ready, interface. This effort is still in its early stages. We have begun to design an interface that stems from some of the same themes that *undersound* presents, while attempting to work on a much smaller scale. In this section, then, we would like to outline the design as it is taking shape, to continue a discussion on where interfaces like *undersound* might inspire future work. While we hope to have a demo of this ready in the next few months, here we will talk briefly about the design concept.

With this project we have decided to greatly narrow the scope to a single venue, and are focused on a more contained user experience. Because of the much smaller-scale, we wanted to more directly support immediate social interactions, more similarly to projects like Jukola [8] or MobiLenin [9], rather than ones drawn out over long time periods between a massive group of people. In order to do so, we decided to design the interface for a medium-sized bar which features a DJ. Further, rather than focusing on the broad exchange of music, we focus the interaction around playing a game which involves listening to–and interacting with the digital objects that represent –music.

What follows is a typical description of one such game-night at the bar. The resident DJ has already chosen his playlist for the night. In this list he has chosen several Creative Commons licensed tracks which have come from local musicians. Before the game-night, artists were able to upload their music in a contest to be featured in the event.

These tracks from local musicians are then distributed on a series of mobile phones. These phones are given to the bar staff, effectively rendering them mobile repositories for the music. Patrons of the bar can opt to play the game by signing up and taking another mobile phone from us. Then, they are grouped into teams. The DJ begins his set, and after a few tracks announces that he will need the game players to find the next track in his playlist. A notification will go up on a publicly situated display about which track needs to be found. Team members will then have to make their way through the bar to find the person who has the song on their phone and negotiate with them to be allowed to download it. While they will be able to search over Bluetooth for the track, they will still need to, possibly, employ a bit of social negotiation to convince the member of the bar staff to authorize the transfer.

Once a team manages to acquire the song they must upload it to the DJ so that he can play it. The DJ will announce that in order for the music to continue, a team must be successful. Hopefully, this will encourage other bar patrons to become involved in order to keep the music playing. After one success, the DJ will then play another track or two, before announcing that the next Creative Commons licensed track must be recovered.

The game will continue in rounds until all the songs have been found. In order to further integrate the other non-playing bar-goers, when a song is recovered and uploaded by one of the teams, it will also become publicly available for download within the bar. That way, anyone who enjoys the track can take it home with them. Over the course of the night, a tally will be kept of how many people downloaded each track, and at the end of the night this chart will be displayed on the public display. Further, these rankings will be incorporated into the final score for the teams. Thus, winning the game depends not only on recovering the most tracks, but recovering the most *popular* tracks. At first, it might be difficult to know which tracks will be popular, but over time as the chart is kept, regular patrons will begin to learn what the crowd favors, and the crowd too will be able to see the trends in their taste.

Though this system is on a much smaller-scale than *undersound* we attempted to embody in it a similar set of principles, allowing us to test both the technology and a bit of the user-experience at the same time. In a similar way local unsigned musicians are encouraged to promote their music using our system and therefore adopting an alternative way to distribute their work. Such music is being rated according to public appreciation in the same way it is in *undersound*, through embodied user interactions like downloading. Further, the ideology behind Creative Commons licensing is supported in this project as well. In addition to this, the relationship between music and location is highlighted, although not in terms of a diverse set of locales, but rather as a representation of what is happening in a particular place over time.

Here, however, the focus is more strongly on the communal and (semi)public aspect of accessing and consuming music, at least within the context of the game-night itself. Though with *undersound* the personal experience of music is also strongly highlighted, we believe this project is a good opportunity to explore the other, more public, aspects of music consumption that *undersound* addresses. Indeed, in our studies, we found that both these aspects of music listening are complex, intertwined, and need to be explored in their own right. Though this game more

strongly encourages social interaction, this was done to reflect the more intimate nature of the venue we are situating our system in.

4. CONCLUSION

This paper has described the design of *undersound* and the ways in which it has addressed certain aspects of a specific experience, traveling by the London Underground. Reflecting on the real-world constraints of such a design for the scope of a large-scale research project, we have described how the arc of our development process has lead to the creation of a small-scale experiment in a bar environment. While the *undersound* prototype is being developed, the bar experiment is being planned for the following months and will help to shape the scope of future steps towards the implementation and interaction design of *undersound* itself.

5. ACKNOWLEDGMENTS

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