

musicWALK

Tunes from your walking experience

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Abstract: Despite various benefits of walking, some people still lack the motivation. In this paper, we present musicWALK - an interactive musical application that aims at enhancing the walking experience. musicWALK generates music by collecting data relevant to personal walking pattern and to the surrounding environment. By allowing people to listen to interactive music generated along their walks, we aid them to establish a stronger connection with their surroundings. We hope that this will provide a stronger motivation for walking.

Keywords: *walking, interactive music, experience, interaction design*

1. Introduction

Walking, considered as a form of physical activity, plays a fundamental role in everyday life. The advantages of walking are felt not only at a personal level, but also at the level of the community as a whole, in fields as diverse as general health, commuting and environmental sustainability [1]. Increasing health problems can be attributed to the lack of walking. The US Department of Transportation Report reported a decline in the number of people walking to work from 4.1% to 2.8% from 1977 to 2001 [2]. As we attempt to encourage walking, we must recognize that we are dealing with a problem of behavioral change. The task therefore requires introducing appropriate change in environments where people are situated [3]. Determining the location, timing, and nature of such change is a complex problem since we are dealing with the complexities of day-to-day human interactions. Multiple disciplines have therefore attempted to address the promotion of walking including ergonomics, architecture and urban design, health and public policy [4,5,6].

1.1 People, Walking, and Environment

Environmental features play a primary role in shaping people's walking behavior [7,8]. Furthermore, walking is strongly associated with a subjective understanding of the surrounding environment and what it offers [9]. This shows that what people think about their surroundings is an important factor in shaping walking behavior. We believe that people's view about their surroundings is shaped by accumulative experiences that arise from continuous interaction within the environment. In our design we focused on enhancing the personal experience of walking by enhancing people's awareness of themselves and their surroundings. In particular, we chose interactive music as our medium to promote the walking experience.

1.2 People, Music, and Environment

As we considered different approaches to promote the walking experience, music was of special interest. This was due to the close analogy we could draw between walking and music: they both involve continuous experiences and personal meaning associated with these experiences. We were therefore interested with the

potential benefit by joining these two activities. On the other hand, the experiences of walking and listening to music are fundamentally different. While walking is interactive and puts the walker in the proactive position of the actor, listening to music is a passive experience where the listener is an audience. We are therefore interested in modern musical trends in interactive generative music, which, in contrast to conventional pre-recorded music, is dynamically generated according to context. In Herber's study, he considers the interactive relationship between music and the listener in urban spaces [10]; he states that the interactive nature of modern media calls for a fresh look at the potential of music [11]. He argues that music can be interactive and generated according to people's actions and contexts, which re-positions the musical experience from passive listening to interaction. We find this approach particularly appealing in our context of promoting dynamic, interactive experiences. In the following sections we demonstrate our research findings that motivated our approach. We then explain our design concept and conclude with the results of our preliminary evaluation.

2. Primary Research

We conducted an ethnographic observation and a focus group to understand the relationship between the walking experience, music and environment. From the ethnographic observation, we aimed to get a general idea about how people walk and to define our target group. From the focus group, we intended to get detailed information about our participants' walking behaviors.

2.1. Ethnographic Observation

Our ethnographic observation was conducted in multiple locations in Bloomington, Indiana, including Well's library of Indiana University Bloomington, a shopping mall, downtown streets and a cafeteria at varying times of the day. We spent 2 to 3 hours to observe people's walking styles and the artifacts they carried in one location. The people we observed ranged from university students to adults no more than 70 years old. These observations helped us to narrow down the target user group and generate a design concept. Our main findings were:

- For most people, walking is not demanding – people do other things, such as using a mobile phone. Individuals are more likely to look around while people in groups are more involved in conversations.
- People have varied walking styles in different places or surroundings. For example, most of the people in the mall tend to look around with little attention to their mobile phones, while people in the downtown street attend to their mobile phones more frequently.
- Many people aged 20-30 approximately used electronic devices such as music players. The most common objects walkers had with them were bags, mobile phones, foods, keys and musical players.
- People were aware of elements in their surroundings such as other people, scenery and traffic.

From the ethnographic observation, we defined our target audience to be students, primarily between 20 and 30, who are face pressures in terms of both academic achievement and career development. We chose this group because we believed that they would greatly benefit from the physical and psychological exercise that walking affords. We found in the observation that students seemed to be relaxed when they walked along with music players, which indicates walking and music can be common ways to relieve pressures. Our observation also shows that this group is receptive for new things, which means the design can be merged into their lives without a lot of persuasion, this could be attributed to their phase of life where they are exploring and learning new things everyday.

2.2. Focus Group

After our observation we conducted a focus group to further explore the walking behavior of graduate students. We sent out a university-wide invitation at Indiana University and 6 graduate students from varying disciplines accepted our invitation for the 45-minute focus group. Since our focus group consisted of graduate students our process can be said to be influenced by this user group, however it's safe to generalize these research findings to other user group's like people aged above 30 or younger than 20. Our research findings were, firstly a person's decision to walk depends on factors such as weather, location, and time. Secondly graduate students sometimes walk for relaxation and are attentive to the walking environment, and sometimes prefer to walk to discover new things in their surroundings. Thirdly mobile phones and music players were frequently used during walking.

3. Design Process

According to our findings, we drew three major insights that helped us inform our design:

- Walking is associated with people's perception of their environment; the experience people have while walking plays an essential role in shaping current walking activity and future intention to walk.
- Walking can be easily coupled with other simple activities to achieve different goals, such as communication and relaxation.
- Interactive generative music has the potential impact on walking.

Based on these insights we concluded that the subjective experience of walking, especially feelings towards the surroundings, has been shown to play a central role in people's walking behavior. We therefore approached the design with the goal of encouraging people to walk by enhancing their walking experience through interactive music. We focused on using music to represent the interaction between people and their surroundings, making the walking experience more attractive.

3.1. Design Concept¹

Our design concept – “musicWALK” is a mobile phone application that generates interactive music for users while walking. The notion of “Interactive music” is defined as music that is dynamically mixed according to specified input factors. These factors depend on the interaction between walking style and the environment. The five input factors we considered are: the frequency of steps, walking speed, the stress of steps, surroundings and weather. These factors were chosen due to their potential in representing the specific situation when someone is walking. Step frequency, walking speed and the stress of steps represent a personal pattern of walking. On the other hand, surroundings tell us about the place where the users are, while weather counts for another walking environment condition. Music generated in our design can be seen as having two layers. The first layer is the background music that is dynamically generated according to the aforementioned factors. This gives users a fresh musical experience every time. For instance, people may experience the fast-rhythm pop music as background music when they walk fast in a street, while they may get peaceful and slow new age music when they walk slowly in the park. The other layer is based on soundtracks chosen by the user. These soundtracks are shaped by the five input factors and arranged with the background music. For instance, the sound track would become faster or slower according to the walking speed, while the beat of the track would not change.

¹ For audible illustration of the concept please email the authors or download the audio samples here: http://dl.dropbox.com/u/2152521/musicWALK_samples/musicWALK_audio_samples.zip

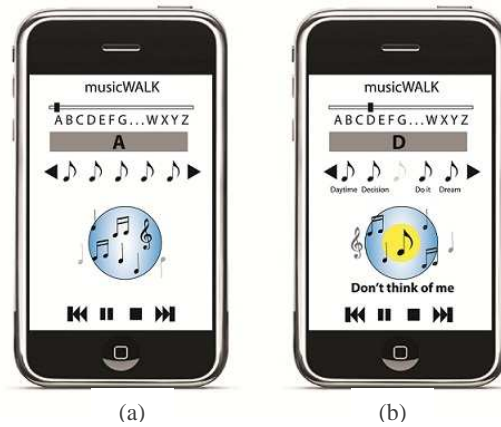


Figure.1: musicWALK interface;

Figure 1 shows the main interface of musicWALK. The top two bars show the current location of the song tracks of the device. The following five music notes represent the song tracks. The two circles on the screen represent the two sources of music: the inner circle with only one music note shows the song track currently being played, and the outer one with many music notes represents dynamic background music. When the application is on, the background is automatically generated. User has the option of listening to the background music only, or can choose a sound track by dragging the music note into the inner circle to interweave with the background. A PLAY button and STOP button are showed at the bottom of the interface. (a) corresponds to listening to dynamically generated background music, while (b) shows a track of choice mixed with the background music.

3.2. Values

The main value of our design in providing interactive music is to encourage graduate students who are primarily between 20 and 30 to walk. However music has no age restrictions and this design could be effective for other user groups as well. It does not require users' attention since music is dynamically generated upon natural interactions during a walk. Moreover, our design provides our target audience the experience of performing their own music which is influenced by the surrounding environment. Not only can our design promote people's awareness of their environment, but it also plays ever changing music that makes every walk a unique experience. Our design is capable of incorporating these factors into interactive music, making walking more attractive in not-so-pleasant weather.

4. Evaluation

In order to evaluate our design, we conducted a usability test with 5 participants. We developed a paper prototype of application, along with some music, which could represent the scenarios of our test. The usability test was made up of two main parts, one was for testing the usability of the application, and the other was for testing the musical experience during walking. The latter part was an improvisation of Wizard of Oz method, with a moderator playing the music according to the walking pattern of our participants. In the first part of usability test, our participants successfully completed 90 percent of the tasks, including opening the application, understanding the interface, navigating song tracks, dragging tracks and controlling the music. But the beginning, some participants were confused about selecting the song tracks. One participant was unable to distinguish the background music and the song track. In the second part of the test, we asked the participants to

walk in the streets and to listen to some pre-recorded music that represented their surroundings. 80 percent of the participants stated that the application could encourage them to walk in some circumstances. 60 percent of them said that they would recommend their friends to use it.

5. Conclusions

Our design aims at encouraging people to walk by enhancing walking experience through interactive music. We intend to improve the interface of our design in regards to the suggestions of the evaluation, making the distinction of the background music and song track clearer. Moreover, we aim to provide a more enjoyable experience to our users. In the future, we'd like to explore the music experience of a group of people and incorporate the selections of music moods and instruments in our design. Interesting as the idea is, it does have the potential for issues of complexity due to people's subjective experience, which we need to carefully consider.

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