

Cover Page

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Introduction

One of the problems identified by observing and listening to visually impaired users is their difficulty understanding where and how web page components are placed on the screen. A regular sighted person can quickly identify objects and map them to certain functionalities. For example, the closing button on a browser is typically red and located on one of the top corners of the webpage. In contrast, a visually impaired person cannot easily map these functionalities to colors or locations. To solve this problem, our system aims to present web pages as their own sonic rooms: 3D sonic environments in which each element of the page is "physically" situated. This allows users to explore web pages as if they were rooms, navigating from one room to another through aural cues.

This prototype consists of a simple website that contains 4 pages. Each page contains a rectangular button emitting a spatialized sound. By moving the cursor, the user can hear the sound change according to how close or far they are from the button. By dragging the mouse towards the sound source, the user should feel the sound "getting closer" until the cursor reaches the button. When that happens, the system indicates that the cursor is hovering over an object by playing a new distinct sound. After the user clicks on the button, they are taken to the next page (room) containing different elements. Again, they follow the aural cues to find the button that leads them to the next page. They repeat this process until reaching the fourth and final page.

The goal of this prototype is not to make the user just go from the first to the last page but to see if and how the sound environment helps them locate the buttons on each page. Users should be able to spatialize themselves on the web pages, and the sound elements should give directions while also pleasing the ears. In addition, the overall navigation process should not be frustrating or complicated, and the users should feel as if they were going from room to room instead of page to page.

Installation Guide

To access our prototype, open your browser and navigate to the following link:
https://www.cs.mcgill.ca/~lduan5/hci/notebook/comp_proto/welcome.html

How navigate the system

To navigate the system, users should not think of it as web pages, but "rooms." Imagine you walk into a physical room, and you immediately see 2 objects in this room. One of them is close to you (Object A), and the other is far from you at the end of the room (Object B). As you walk towards Object B, you can see the distance between you and Object B decreasing, and you can

feel Object B getting closer. When you reach Object B, you look around and see that Object A is distant from you, and you perceive it far away.

The same idea of walking into a room and moving towards objects applies to our system. However, instead of seeing physical things in the physical world, our prototype consists of hearing buttons (objects) located in web pages (rooms). When the user first accesses the prototype, they see the welcome page. Users should put on headphones to adequately hear the web page sounds on the next page.

As they move from the first page to the second by pressing the "Next Page" button, users should feel like they are walking into a new room containing multiple noises. They will hear sounds coming from different directions relative to the position of their cursor. At this point, users who are not visually impaired should be wearing blindfolds to simulate visual impairment. There will be distinct sounds, each one corresponding to the position of a button on the page. The closer a button is, the more intense, loud, and central the sound of the button should feel. For example, if a web page's button is placed on the bottom right, and the cursor is positioned in the center of the page, the user will hear a sound coming from underneath them on their right side. By dragging the mouse towards the apparent sound source (bottom right of the screen), users should feel the sound "getting closer" to them, meaning the sound becomes louder and more centralized as if they were standing in front and on top of loud audio speakers. When the cursor reaches the button and the sound is as central and loud as it can get, the system indicates that the cursor is hovering over an object by playing a new distinct sound on top of the existing sounds. At this point, if there are more objects on the web page, the user should still be able to hear them, but they will appear distant. If the user drags the mouse away from the button it is hovering, the distinct sound that had started will stop, indicating that the user is no longer on top of a button. After moving the mouse across the page for a few moments, the user should know where the objects are located relative to one another and should be able to move the cursor towards the desired page element. After the user clicks on a button, they are taken to another page (room) with a different layout. Every room contains audio features that help users navigate to the page's objects, and every page's aural environment is distinct so that the user knows which room they are walking in.

Flow of the Website - Tasks & instructions we want you to follow

Step 1: After the installation process, you will see our welcome page as the first page. Please click the button at the bottom right to start the website.

Step 2: Please read the instructions on the page.

Step 3: (Image of the first page) Put headphones on after you click the start button.

Step 4: Cover your eyes fully if you are not visually impaired when you go to the second page.

Step 5: Listen carefully to the sound. There are two sounds representing buttons. Please note that when you come closer to one button both sounds will increase their volumes.

The first major task that we give to you is to **find the button on the bottom right of the page to go to the next page**. It's easy to do with eyesight, but our system is designed for visually impaired people. Trying your best and being patient is the key to completing the task. When you find the button successfully, you will hear a "tic-toc" sound telling you that it's the right place.

Step 6: After you find the button to go to the next page, you can double click it and you will hear a "ding" sound which represents you successfully finding the button and going to the next page which is the second major task.

Step 7: The third task is to repeat all previous steps and navigate through pages.

Step 8: The last task for website navigation is to reach the end of the prototype.

Other tasks: Our system is designed for visually impaired people, so our system will be designed as easy as possible. It is not a system with many functionalities as a normal website. As a result, there are not so many tasks to complete. But the major thing we want you to think about is described in the "How to navigate the system" section. We want you to think of our system as a room, think about how the system benefits the visually impaired people, and tell us your observations, experiences, and suggestions in the report. Those are the logical results we want to collect and these are the important tasks we want to assign to you.