

# Web Interface for Designing and Sharing Sound Space

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**Abstract.** Services of sharing information such as videos or images become popular on the internet. Flickr or Youtube is one of the most successful web-sites. On the other hand, high quality contents created by professionals today use multi-surround audio or 3-Dimensional CG. On the internet, web services that consider spatiality of information also have appeared. However, up until now, 2-Dimensional display has been used to get or share the 3-Dimensional information of web services. As a result, its spatiality was lost and reality that information essentially had also was lost. To solve this problem, firstly we have developed low-cost and scalable 3-D auditory display. In this research, we developed the system for designing sound space that can be reproduced on our auditory display. This system gives us intuitive designing interface like general image processing tool and enables us to share sound space on the web.

## 1 Introduction

The internet enables us to get or share various information such as images or videos. “Flickr” or “YouTube” is one of the typical web services. In these services, it is possible for general users to make contents and to upload them, and the method itself is the reason why this kind of services has succeeded although contents are sometimes low quality. On the other hand, high quality contents (movies or TV games, etc...) created by professionals today use multi-surround audio or 3-Dimensional CG, reality of information become higher with its “spatiality”. On the internet, web services that consider this spatiality of information also have appeared. For example, Google’s StreetView or EveryScape give us 3-Dimensional view. Especially, EveryScape can show indoors as well as outdoors, and users can window shop as if they are walking on the real street.

Thus we can get more reality of information with its spatiality. However, in many cases, 2-Dimensional display has been used to get or share 3-Dimensional information of web services. As a result, its spatiality was lost and reality that the information essentially had also was lost. Therefore, to get or share 3- Dimensional information with its spatiality, the display which can represent the spatiality of information is necessary.

To resolve this problem, systems of Mixed Reality or multi surround auditory have been researched [1]-[4]. Moreover, Hughes has developed “Sound-Designer” that enables to design sound space by GUI [5]. However, most of these researches use special device to represent 3-Dimensional information, and most of design tools

remain only configuration tool, and do not consider sharing the information on the internet.

Therefore, first of all, we have developed low-cost and scalable auditory display that can represent spatial information by controlling network connected PCs with speakers [6]. In this research, we develop the system for designing sound space that can be reproduced on our auditory display. This system gives us intuitive design interface like general image processing tool and implemented as a web system. Therefore, it is possible to share audio information with spatiality on the internet like Youtube or Flickr.

## 2 System Overview

The System of this research is composed of "Design System" for designing sound space, "Download System" to download designed sound space, and "Auditory Display" that we have already developed. Fig.1 shows system overview. The system is divided into a system on the internet and a system in local environment. "Design System" and "Download System" are used on the internet, and "Auditory-Display" is used in local environment. Users can design, share and play sound space by using these 3 systems.

The number from 1 to 6 of Fig.1 shows flow from accessing to web system to playing sound space on "Auditory Display". In this system, firstly, user access to systems on the internet. Next, users design sound space by using "Design System", and designed sound space is downloaded in local pc by using "Download System". Finally, users input the downloaded sound space data into "Auditory Display" and listen to it.

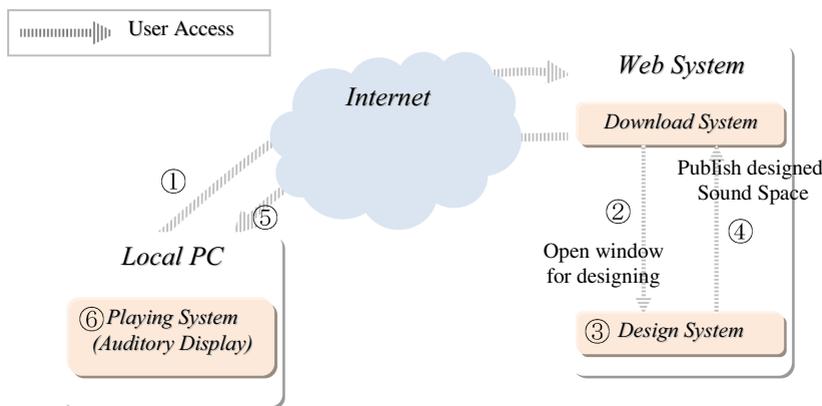


Fig. 1. System Overview

### 2.1 Interfaces of the System

Fig.2(a)-(d) show interfaces of our web system. This web system control user account for smooth management of downloading and searching. Therefore, when users accessing to web system, firstly "Login Window" is displayed for session setup. In the "Login Window", users type "User ID" and "Password" and log in the system. After

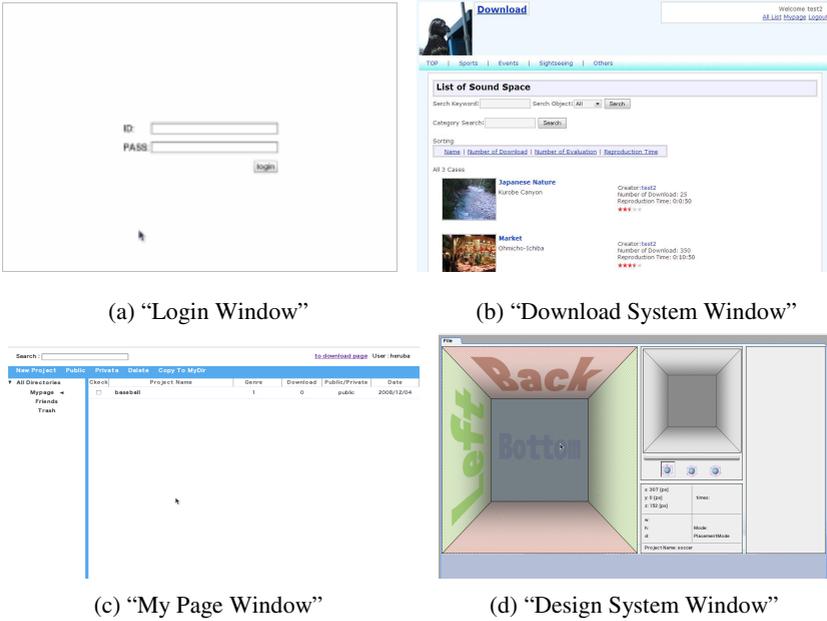


Fig. 2. All Windows of Web System

logged in, "Download System Window" is displayed. By displaying "Download System Window" before displaying private page "My Page Window", users can access uploaded contents directly. In "Download System Window", user can search contents by contents category, designer's name and so on.

When users want to design a sound space, users move to "My Page Window" from "Download System Window". In this window, users can create new sound space contents or delete, and also can publish designed sound space contents or not. When users design sound space, they click "New" button and display "Design System Window". Users can create sound space contents by using this window. After creating contents, it is included into contents list of "My Page Window", and user can share them with other users by publishing procedure in "My Page Window".

## 2.2 Design System

In previous works [5], users design sound space by configuring acoustic field where they play the contents. On the other hand, in our system, user design sound space by placing sound objects on virtual space.

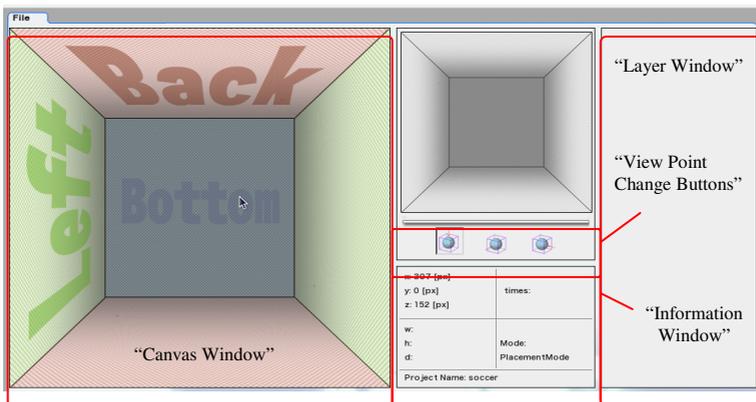
Our system have been developed by Ajax (Asynchronies JavaScript and XML) technology. When this kind of rich client system was developed, Flash technology was used before. However, vendor sites have changed the technology from Flash to JavaScript, by appearance of Google Maps and Google Documents. In this research, design system should work like local application so that we selected Ajax technology for implementation.

Graphical User Interface of our system had an appearance of paint soft. Therefore, users can design sound space as if drawing a picture without special knowledge. However, there is some different points form existing paint software. In generally, paint software have used 2-Dimensional canvas, but our system has used orthographic views having depth information for placing objects 3-Dimensionally (This depth information enables us to design sound space much easier than ordinary orthographic views). User designs sound space by placing sound objects in virtual space of orthographic views.

Fig. 3 shows "Design System Window". This window are composed of 4 sub-windows; "Canvas Window", "Layer Window", "Information Window", "View Point Change Buttons". Table 1 shows outline of these windows.

**Table 1.** Sub-Windows of Design System

Windows	Function
Canvas Window	In this window, users can place sound object and set animation for moving sound object. It has orthographic views having depth information.
Layer Window	In this window, Each created layers are listed. Users create some sound layer like paint software and each layer has information of placed sound object.
Information Window	This window shows numerical information of sound object such as a position. This information is displayed when cursor is placed on objects in Canvas Window.
View Point Change Buttons	These three buttons correspond to top view, front view, and right side view. User can change view point and place sound objects 3-Dimensionally with these buttons.



**Fig. 3.** Design System

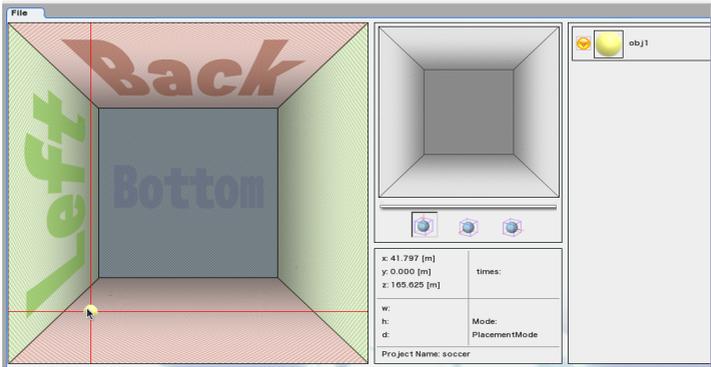


Fig. 4. Placement of a Sound Object

**Basic Operation for Placing Sound Object.** To design sound space, firstly, users enter some information ("Project Name", "Real Space Size (m)", "Time (min)") to the form window for a creating new project. "Real Space Size" is a sound space size, and volume of sound space is calculated from this size. Created sound space is always cubic, so users enter only one side. "Time (min)" is playing time of contents.

The window in Fig.4 is displayed after user created a new project. Using this window, users place a sound object on sound space. To create a new sound object, users select "creating new object" from context menu that is displayed by right clicking on "Canvas Window". In this form, users enter "Object Name", "Sound Source File", "Position of Sound Source" and the other options. After inputting the information into the form, a new sound object is displayed. A sound object was placed as a yellow boll shown in Fig. 4. If users want to place created sound object on another position, click placed a sound object and move it to a desired position, and click again. Thus, users can replace sound object on new position very easily and design sound space by repeating these procedures. After users designed sound space, they can save them on the web system by selecting "button of save" from menu at top and left of the window. Information of designed sound space such as project name, creator's name are saved on database of the system, and they are used by download system.

**Setting Animation.** If users want to add information of motion to a sound object, users have to select "animation of sound object" from context menu of object by right-clicking on a placed sound object. After this procedure, present window move to next window for setting animation. Fig. 5 shows its window. In this window, "Time Line Bar" is added into a base window of design system. This time line bar enable user to set speed of sound object. Firstly, users select "linear moving" from context menu by right-clicking on a placed sound object. After selected this menu, base points and path that connects base points are displayed (shown in Fig. 5) by double-clicking on "Canvas Window". Each base point of moving path corresponds to allow of "Time Line Bar". Moving these arrows, user can set speed of a sound object. User can set motion and speed of all of sound objects by repeating these procedures.

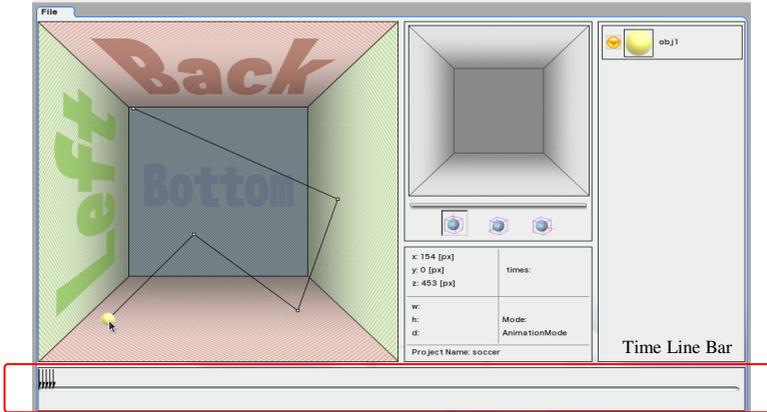


Fig. 5. Window for Setting Animation of a Sound Object

### 2.3 Download System

Fig. 6 shows "Download System" for downloading and sharing designed sound space. This system enables to download contents by searching for information of designed sound space from database ("Creator's Name", "Creator's Comment", "User's Comment for Evaluation", "Tags", etc...). If users want to search any words from these information, users enter words into search form on Fig.6. If user wants to search created contents by a certain user, user just only click user name and system display all created contents of certain user. In addition, the system can sort list of contents by "Download Count", "Title" and another. Thus, users can find contents very quickly by using searching function.

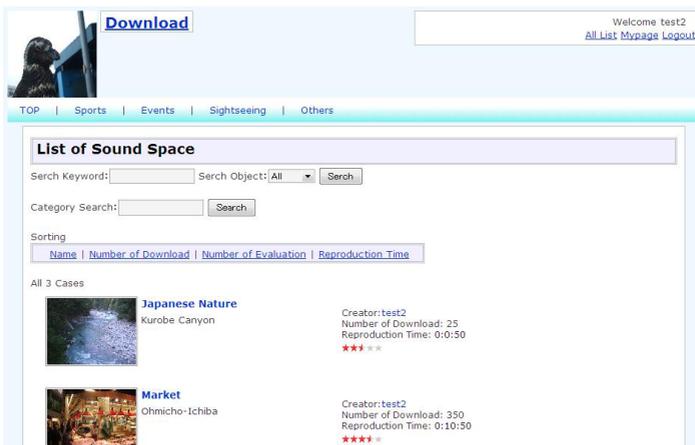


Fig. 6. Download System

### 3 Contents

In this system, users have to prepare sound resources to create contents. In general, in the case of recording multi surround sound, special recording device is necessary. However, in our system, user can record sound source with microphone on cell-phone. Therefore, users can record sound source simply (If user want to improve quality of contents, user had better use commercial microphone for recording sounds and place recorded sound source as same as real space.). After recording sound source, user clips a usable part from recorded data and uploads them.

In our system, user can share sound space and enjoy downloaded contents very easily. For example, user can feel excitement of sports game like baseball or baseball by listening to not only sound of auditorium but also position of players. User can also feel like going to trip by listening to the sound space other tourist designed. Moreover, sound space has higher reality so that our system transmits important information quickly. For example, Hurricane Katrina attacked south part of United States in 2005, and the damage was enlarged by slow response of the citizen to the hurricane. If information of typhoon was transmitted with its spatiality, sense of crisis of citizen was heightened, and it could alleviate suffering.

### 4 Conclusions and Future Work

In this research, we have developed the web system that composed of "Design System" for designing sound space with sense of drawing picture by paint software, and "Download System" for sharing designed sound space. In addition, using our "Auditory Display", users can enjoy high reality contents easily.

Our system has used only sound information for representing spatiality. However, in future works, we will share not only sound but also image by using multimodal device that integrates head mount display and our multi channel speaker system. With this system, users can share information with higher reality. In addition, we will improve versatility of the system by adding data conversion function for multi surround format which 5.1ch surround system uses.

### References

1. Gyorbiro, N., Cohen, M.: Mobile Narrowcasting Control and Display of Spatial Sound. Information Processing Society of Japan, SIG Notes 2008(54), 69–72 (2008)
2. Higa, K., Nishiura, T., Kimura, A., Shibata, F., Tamura, H.: A two-by-two mixed reality system that merges real and virtual worlds in both audio and visual senses. In: Proc. of 6th Int. Symp. on Mixed and Augmented Reality, pp. 203–206 (2007)
3. Lee, N.: IOSONO. Computers in Entertainment 2, 3 (2004)
4. Fernando, O.N.N., Adachi, K., Duminduwardena, U., Kawaguchi, M., Cohen, M.: Audio Narrowcasting and Privacy for Multipresent Avatars on Workstations and Mobile Phones. IEICE transactions on information and systems E89-D(1), 73–87 (2006)
5. Hughes, D.E.: Defining an Audio Pipeline for Mixed Reality. In: Proc. of Human Computer Interfaces International 2005, CD-ROM (2005)
6. Ikeda, S., Yamamoto, T.: Auditory Display using Network Connected Multiple Computers (in Japanese). In: Proc. of HIS 2008, pp. 461–466 (2008)