

# VoiceBlog for Blind and Weak-Eyed People

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**Abstract.** We introduce VoiceBlog, a blog reading browser based on the concept of universal design. Existing screen reading software used by blind people for PC access fails to support rapid understanding of the original blog structure and contents. VoiceBlog has a cascading user interface, hierarchically structured, and can well parse strictly-structured Web content such as blogs. It uses an audio user interface rule, which simplifies the comprehension of contents and menus (arrangement of contents based on construction, simplification, and navigation) to allow blind and weak-eyed people to comfortably access blogs. Blind people can use the keyboard to access all functions. The arrangement and design of icons, colors and correspondence to hi-contrast functions can be customized for the weak-eyed and color blind. Four blind and four weak-eyed people participated in trials of VoiceBlog. The results showed that it allows the blind to access blog contents easily because keyboard manipulations are similar to usual reading browsers and screen readers. The shapes and color of the icons are easy to recognize for weak-eyed people.

**Keywords:** Universal design, blind people, blog reading browser, blog, hierarchic structure, cascading user interface.

## 1 Introduction

Universal design ( UD ) of information is important, and various studies have been made in response to the aging of society. UD of the Web should ensure that everyone, including senior person and persons with disabilities, can access information on the Web[1][2][3]. NTT has been studying universal design technology[4][5][6]. Recently, the use of Blogs, by which the individual can easily disseminate information over the Web, has increased rapidly. However, screen readers and voice browsers (hereafter, reading out software) fail to permit easy understanding of the content and structure of Blogs. We developed the approach of analyzing the layered structure of Blogs and used it to develop the reading out software VoiceBlog[7]. This paper reports on the interface design of VoiceBlog as it impacts the blind and weak-eyed people.

## 2 Problems with Screen Readers

The people who use voice reading out software include many with weak-eyes. This is because it is easier to hear the text spoken than to try to read it. In many instances,

such users often try to follow the text while listening to the speech. Therefore, it is necessary to optimize the display arrangement in addition to the reading software. The following problems exist when the blind and the weak-eyed read blog articles with existing reading out software.

First of all, when a blog is read out, it is sequentially read from the top of the page. In many cases, the menu of the blog and the title list corresponding to the menu are read early on, and articles cannot be reached easily. In addition, it is difficult to understand the blog's structure.

If the zoom function is activated, mouse movements become constrained to the displayed area[8]. This makes it very difficult to move between the top and bottom of the original page.

In addition, many weak-eyed users employ the high contrast mode of Windows Accessibility Option because it prevents screen reflections from preventing character from being seen[8]. The high contrast mode changes the background color and the character color to those set by the user. In general, the background color is black and the text colors are white/yellow/green. Another problem is that if high contrast setting is selected, some screen/menu elements become very difficult to discern due to poor or non-existent contrast.

### 3 Overview of the System

Blind users stated they desire for an Auditory User Interface (AUI) that specializes in aural presentation. Additionally, for the weak-eyed, icons were centralized to reduce the distance over which the mouse had to be moved. The icons were modified so that they could be easily read even if the high contrast function was used. Color combinations were developed that perceived even by those with color vision troubles.

#### 3.1 Cascading User Interface

A key feature of blogs is their complexity; they offer so many different elements. The sighted user has complete freedom to scan the page and determine how he will access the contents. It is possible to reach the blog article desired from among the displayed contents by one click operation. However, because the other users must sequentially listen to all information, it is difficult to understand the blog's structure (links to articles, menu and so on). Therefore, it is important to create a process the handicapped user is presented with just that information needed to make the next control operation. We decided to convert the blog structure into a cascading display of menus and articles; the intent is to simplify the acquisition of information and subsequent navigation actions.

Figure 1 shows the system structure of VoiceBlog. In the Display/Operation part, VoiceBlog sends an http request via Internet to the goo-blog server after the user selects the title of a blog or inputs a URL in the Display/Operation part. Upon receiving the desired HTML source file from the server, VoiceBlog analyzes the file and determines which texts should be read aloud. The reading part analysis engine uses selection rules based on the special tags and the structure of the HTML source. The reading part analysis engine sends the texts to the synthesis engine which

verbalizes the texts through the PC's speaker. At the same time, the texts as well as the images, if any, are displayed on the PC's screen by the Display/Operation part. The voice synthesis technology used in the synthesis engine is “Fluet”, which is based on phonological knowledge and clustering[9]. “Cralinet” which is a text-to-speech synthesis technology based on the corpus-based approach can also be used[10]. The Fluet version of VoiceBlog was used in the below analyses.

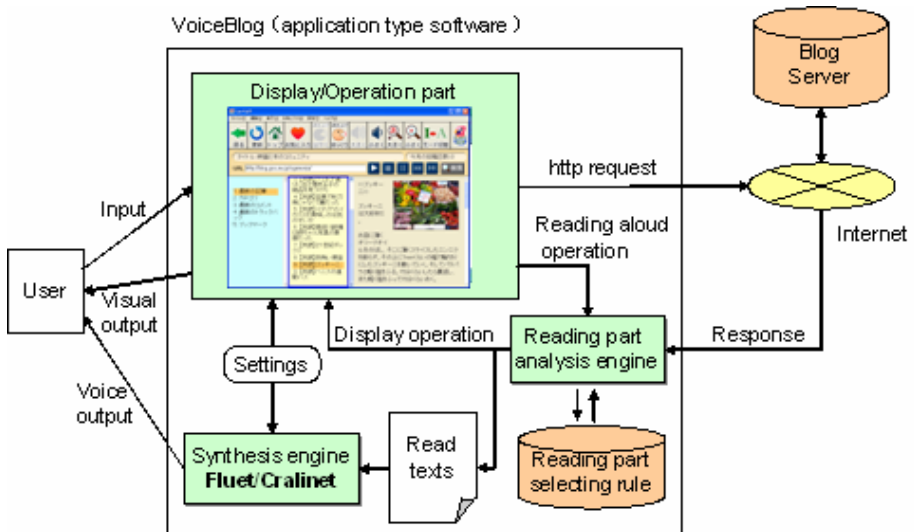


Fig. 1. System structure of VoiceBlog

The top page of goo-blog[11], a very popular commercial web site, is extremely busy with many menus, lists of contents, login panels, various templates, “New article”, and “Access ranking” and so on. However, it takes too long to reach a target article if the article lies at the bottom of the page. VoiceBlog optimizes the content selection process and content presentation order to significantly improve blog article access. That is, the top page of goo-blog is replaced with a single menu whose contents and content order are decided by daily use. From an interview of 16 blog users, we decided to use the order of “1.New article”, “2.Access ranking”, “3.Pick up blog” and “4.Official blog”. We added “5. Search” to these four entries. For blog pages we decided to set five entries on the top page: “1.Recent article”, “2. Category”, “3.Recent comment”, “4.Recent track back”, and “5.Bookmark”.

### 3.1.1 VoiceBlog Graphics Components

Figures 2 and 3 show the graphic components of VoiceBlog. There are nine graphic elements.

1. Blog Operating Icon (11 icons : back, volume, text size etc )
2. System State ( It shows system state, accessed blog information etc. )
3. Blog Title ( Blog Title user selected )
4. Post Number (The number of author posted article )

5. Text Box for URL display and input ( Blog URL )
6. Sound Controller ( 6 icons: for reading and finding keyword )
7. Menu Area ( The goo-blog Selecting menu and blog operating menu )
8. Title Area ( Blog title lists and blog article title lists )
9. Content Area ( Blog article selected blog title )

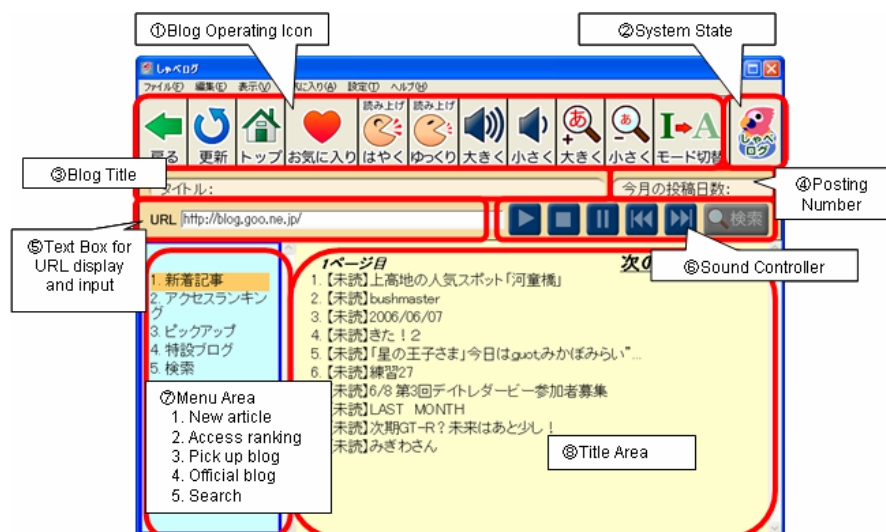


Fig. 2. Example of the goo-blog top page via VoiceBlog



Fig. 3. Explanation of VoiceBlog graphic components

The top screen of VoiceBlog shows two sub-windows; menu on the left and title list on the right as shown in Figure 2. Each blog screen accessed by a link from the title list on the top screen shows three sub-windows; menu on the left side, title lists in the center side, and target article on the right. Only the information needed to make a selection is read out sequentially because the menu and the title list are delimited by the cascading structure. This makes it easier and more efficient to reach the blog article text; only three short operations are needed ( Operation1:Blog menu selection, Operation 2:Blog title selection, Operation 3:Reading of target blog article).

## **3.2 User Interface for Blind and Weak-Eyed People**

When designing the User Interface ( UI ) we paid particular care to the needs of blind and weak-eyed people as described below.

### **3.2.1 Universal Access**

The blind operate the software only through the keyboard. In VoiceBlog, all the operations usually done by mouse operation can be also done by keyboard operation. In keyboard operation, menu movements are made via the Tab key and upper and lower, right and left keys. The shortcut key was set to the main function. The key allocation of the shortcut key was set to duplicate, as much as possible, the same allocation offered by Internet Explorer ( IE ), the screen reader, and a voice browser, and so on. As a result, current operation experience is most effectively reuse. For instance, the page can be updated with the CONTROL key or the F5 key.

### **3.2.2 Layout and Design of Icons**

When the zooming function is used by weak-eyed people, the screen area available to support mouse operation is very limited. Various operation icons and sound control icons were placed in the upper part of the screen to ensure that as many icons as possible remained in view and available for selection. Various operation icons were made much larger than IE icons to make mouse operations easier.

### **3.2.3 Screen Color Selection**

People with visual disabilities often experience difficulty with different color combinations and they have their own preferences. To accommodate this need, the display color of the screen should changed to suit the user. Four color combinations (Type 1-4) that consider even the color blind were developed by using the color vision simulation software Vischeck[12]. Type 1, for seniors, uses a white background color black text, see Figure 4. Type 2, for the weak-eyed, uses a black background and white text, see Figure 5. Types 3 and 4, shown in Figure 3, are well preceived by the color blind.

### **3.2.4 Supporting the High Contrast Function of Windows Accessibility Option User**

When the high contrast function of Windows Accessibility Option is used, the black background and white text of the standard PC display are reversed and most areas of

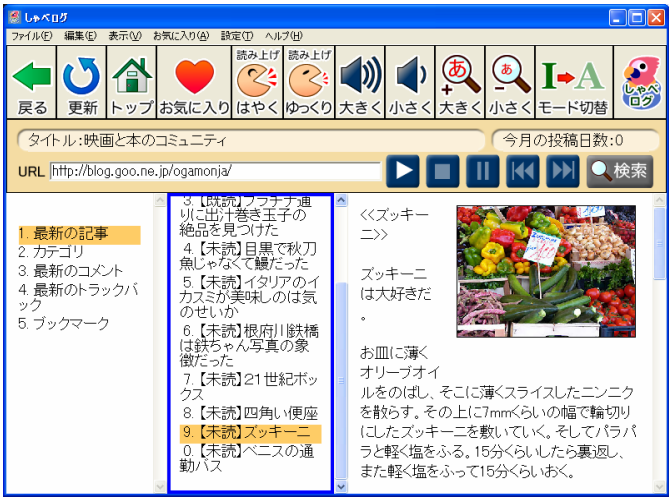


Fig. 4. Example of type 1 screen (background color: white, text color: black)



Fig. 5. Example of type 2 screen with hi-contrast function active (background color :black, text color:white)

the screen background are displayed in black. It is necessary to design the menus so the icons and other control buttons remain visible. Figure 6 shows an example of the screen when type 2 is selected and then the high contrast function. When the gray background areas of various operation icons are changed to black, it often becomes difficult to see icons and text, see Figure 6(a). the solution is to use white lines to delineate the icons and text, see Figure 6(b).



**Fig. 6.** (a) Upper: Icon and text contours without white border (b) Lower: Icon and text contours with white border

## 4 Evaluation by Blind and Weak-Eyed People

We investigated VoiceBlog in a trial by five blind and three weak eyed people. The execution period was about one week. At the beginning of the trial, all subjects were given a CD-ROM and told to install VoiceBlog on their personal computer and use it as their default browser for one week. All subjects were registered to the same mailing list through which they received daily questions (via e-mail) about their experience with the installation process and the Help file of VoiceBlog, what were their preferred functions, and the operation of VoiceBlog overall. We provided guidance via e-mail when the subject posed some question about operation. The

**Table 1.** Evaluation Results

Category	Subject	Comments made via e-mail
Structure	Blind	Can access article text without an extra reading out.
		The layout of the screen is comprehensible.
Sound	Blind	The tone quality of the effect sound firmly felt; jarring.
		It is not easy to catch it because it differs from usual screen reader; reading out tone quality and reading out method are different from normal.
	Weak-eyed	The effect sound while operating is useful.
UI	Both	The volume of the effect sound is larger than that of reading out.
	Blind	The key operation corresponds to known key operation.
		The shortcut key is enhanced.
		It is easy to see blog operating icons and the sound controllers.
	Weak-eyed	Even if the high contrast function is used, the icons can be recognized.

comments of the subjects are summarized in Table 1. The demands from the subjects are summarized in Table 2.

**Table 2.** Requests for VoiceBlog enhancement

Category	Subject	Comments made via e-mail
Guidance	Blind	Voice guidance function concerning operation
	Weak-eyed	Balloon function to recognize function of icons
Install	Both	The installation begins automatically.
	Blind	Repeat explanation of VoiceBlog
Help file	Blind	Easy explanation of various terms even if it hears
	Weak-eyed	The Help file can be displayed in the user's color setting.
	Both	Explanation of key operation with use
Blog article operation	Both	Copy function addition of blog title and content of article
		Link function addition from blog article to other Web sites
		Comment function and track back function addition
Color	Weak-eyed	Color customization to be user set

5 Discussion

Our study considered two VoiceBlog features; improving the efficiency of accessing blog articles by the cascading blog structure and UI that is effective for both blind and weak-eyed people.

Table 1 shows that blind people are comfortable using known key operations while weak-eyed people can see display items clearly even if the high contrast mode is used. Table 2 shows the weak-eyed subjects asked for control over the display colors and both groups wanted various voice guidance functions.

It is necessary to develop some intuitive function that allows the menu window items to be increased or reduced. For example, some subjects asked that the blog menu window be extended with the addition of comment and trackback posting functions.

6 Conclusion and Future Work

Blog access is becoming more frequent. However, the complex structure of blogs is not well handled by screen readers or voice browsers. This article introduced VoiceBlog; it offers several features to allow the blind and weak-eyed to access blogs much more easily and efficiently.

VoiceBlog has two main features.

- Its hierarchical display, based on blog structure, yields efficient access to blog articles
- Its UI is highly supportive of the visually disadvantaged ( Universal access, layout and design of icon, Color selection, adapted for high contrast function )

Trials showed that it allows blind and weak-eyed people to well understand the structure of a blog. VoiceBlog also targets those normal users who have become tired with reading screen after screen; they are likely to find the synthesized voice highly



interesting. Computer novices are another likely audience. We intend to develop informative pop up labels for icons that provide various voice guidance instructions.

## References

1. Web Content Accessibility Guidelines 1.0 <http://www.w3.org/TR/WCAG10/>
2. Japanese Industrial Standards Committee, JIS X-8341-3 Guidelines for older persons and persons with disabilities – information and communications equipment, software and services – Part3 Web Content: (in Japanese) (2004)
3. Universal IT Design Center, NTT [http://www.waza.jp/ud\\_e/index.html](http://www.waza.jp/ud_e/index.html)
4. Asano, Y., Watanabe, M., Hamano, T., Ogawa, K.: Web Accessibility Guidelines that Solve Problems Peculiar to Japanese. In: Proceedings of WWCS 2004, pp. 601–606 (2004)
5. Watanabe, M., Okano, A., Asano, Y.: Universal Design Guidelines for Web Contents. NTT Technical Review 3(11), 17–22 (2005)
6. Watanabe, M., Okano, A., Asano, Y., Ogawa, K.: VoiceBlog: Universally Designed Voice Browser: IJCHI (In press)
7. Asakawa, C., Itoh, T.: User Interface of a Home Page Reader. In: Proc. the 3rd International ACM SIGCAPH conference on Assistive Technologies(ASSETS'98) pp. 149–156 (1998)
8. Make Windows XP More Accessible for Everyone, Microsoft  
<http://www.microsoft.com/windowsxp/using/accessibility/default.msp>
9. Yoshida, Y., Nakajima, S., Hakoda, K., Hirokawa, T.: A new method of generating speech synthesis units based on phonological knowledge and clustering technique. In: Proceedings of ICSLP '96 pp. 1712–1715 (1996)
10. Mizuno, H., Asano, H., Isogai, M., Hasebe, M., Abe, M.: Text-to-Speech Synthesis Technology Using Corpus-Based Approach. NTT Technical Review 2(3), 70–75 (2004)
11. goo-Blog, NTT Resonant Inc. <http://blog.goo.ne.jp/>
12. Vischeck <http://vischeck.com/>