# WebAnywhere: A Screen Reader On-the-Go

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## ABSTRACT

People often use computers other than their own to browse the web, but blind web users are limited in where they access the web because they require specialized, expensive programs for access. WebAnywhere is a web-based, self-voicing browser that enables blind web users to access the web from almost any computer that can produce sound. The system runs entirely in standard web browsers and requires no additional software to be installed. The system could serve as a convenient, low-cost solution for both web developers targeting accessible design and end users unable to afford a full screen reader. This demonstration will offer visitors the opportunity to try WebAnywhere and learn more about it.

## Categories and Subject Descriptors

K.4.2 [**Social Issues**]: Assistive technologies for persons with disabilities; H.5.2 [**Information Interfaces and Presentation**]: User Interfaces

## General Terms

Design, Human Factors

## Keywords

screen reader, web accessibility, blind users

## 1. INTRODUCTION

People often use computers that are not their own. From terminals in public libraries to the local gym, from coffee shops to pay-per-use computers at the airport, from a friend's laptop to a school laboratory; computers are used for a variety of useful tasks that most of use take for granted, such as checking our email, viewing the bus schedule or finding a restaurant. Few would argue that the ease of use of web mail or document editors has surpassed desktop analogs, but their popularity is increasing, indicating the rising importance of accessing the web from wherever someone happens to be. Blind web users lack the ability to access the web from all available computers because their access relies on expensive, specialized software programs called screen readers. WebAnywhere is web application that can be accessed and used from any standard web browser.


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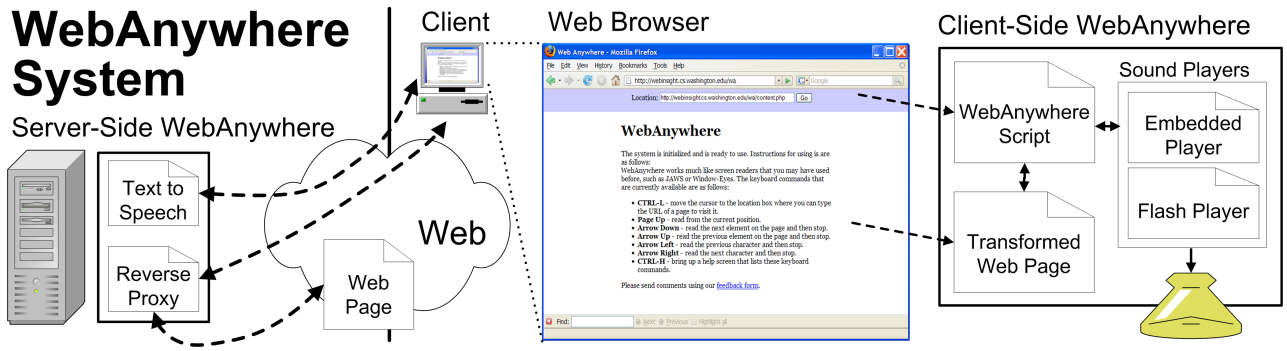
**Figure 1: People often use computers other than their own, such as a computer in a university lab, a kiosk at the local library, or even a friend's laptop.**

Traditional screen readers such as JAWS [2] or Window-Eyes [1] are expensive, special-purpose software programs and are seldom installed on public terminals or other computers not normally used by blind individuals. The Fire Vox screen reader[1] is a free Firefox extension, but is similarly unlikely to be installed on most systems. Users are rarely given permission to install new software on public terminals and many would be hesitant to install new software on a friend's laptop. Scribd.com[2] converts documents to speech for free, but does not support interactive navigation of converted documents. Portable alternatives are quite costly. The Freedombox System Access Mobile[3] screen reader on a USB key is available for nearly $500, but requires access to a USB port and permission to run arbitrary executables. PDA solutions such as Braille Sense[4] cost roughly $5000. A smartphone with the screen reading software Mobile Speak Pocket[5] costs about $1000. Many cannot afford or would prefer not to carry such an expensive device.

The WebAnywhere screen reader enables blind users to quickly access web content on any available computer and supports a rich set of user interaction. Users can browse through the DOM of web pages viewed by paragraph, sentence, word or character. They can also quickly navigate

[1] www.firevox.clcworld.net/
[2] www.scribd.com
[3] www.freedombox.info/
[4] www.gwmicro.com/Braille_Sense/
[5] www.codefactory.es/




between tab-indexed elements, heading element, form elements and links using standard keyboard shortcuts. Form input is also supported and does not require a separate forms mode. Because the system is web-based, it leverages existing functionality in standard web browsers.

WebAnywhere is also useful for web developers and blind users who cannot afford a traditional screen reader. Mankoff *et al.* showed that web developers create more accessible web pages when they review them with a screen reader [5], and WebAnywhere provides a convenient, inexpensive mechanism to do so. For blind users unable to afford a traditional screen reader, WebAnywhere might serve as a temporary alternative. Voice output while navigating through a page can also be beneficial for people who have low vision or dyslexia. The technology introduced in WebAnywhere could provide this functionality anywhere.

## 2. SYSTEM DESIGN & EVALUATION

The design of WebAnywhere is similar to a traditional screen reader. It differs because it moves some operations to a remote server and includes functionality designed to compensate for web application limitations. The system consists of the following three components: 1) client-side Javascript that supports user interaction, determines which sounds to play and coordinates the other subsystems, 2) server-side text-to-speech generation and caching, and 3) a server-side reverse-proxy that makes web pages appear to come from a local server to overcome cross-site scripting restrictions. The system plays sounds using the SoundManager 2 Flash Object[6]. Adobe reports that 98.7% of desktops have Flash installed[7]. WebAnywhere also supports embedded sound players for increased compatibility. WebAnywhere's use of Javascript to capture a rich set of user interaction is similar to that of UsaProxy [3] and Google Analytics[8]. A diagram of the system is shown at the top of this page.

If the browser window containing WebAnywhere loses focus, the system is unable to respond to user input. WebAnywhere attempts to prevent losing focus by aggressively blocking popup windows and page redirects that do not go through the reverse proxy. In the event that focus is lost, users can switch through applications (Alt-Tab on most systems) until WebAnywhere receives focus and announces itself. The latency of retrieving each new multi-second sound is roughly 500 ms and prefetching sounds improves this by about 20%. Cached sounds are retrieved immediately.

WebAnywhere has been developed with consultation of blind web users. These potential users have been overwhelmingly enthusiastic about the system. In an informal evaluation, three blind participants (1 female, 2 remotely-located), could effectively browse the web using WebAnywhere. During this evaluation, we first outlined the available features of the WebAnywhere system and then explained the available functionality and shortcut keys. We then asked our participants to visit the google.com search page, submit a query and read the results. All of our participants were able to successfully complete this task with only limited verbal coaching. Our participants listed the lack of the full screen reader functionality as the main limitation of the system. Notably, no one mentioned latency concerns and all thought the responsiveness of the system was adequate. During additional unstructured browsing, the WebAnywhere window occasionally lost focus due to unblocked popups, but participants independently returned to the WebAnywhere.

Future versions of WebAnywhere will implement more features offered by commercially-available screen readers. Users that evaluated our system requested support for key combinations specific to either JAWS or Window-Eyes and we will provide such customized modes. We also plan to add support for browsing secure sites and support for accessibility improvement using our Accessmonkey Framework [4].

[6]www.schillmania.com/projects/soundmanager2/
[7]www.adobe.com/products/player_census/flashplayer/
[8]www.google.com/analytics

## 3. REFERENCES

[1] GW Micro Window-Eyes, 2006. http://www.gwmicro.com/Window-Eyes/.

[2] JAWS 8.0 for windows. Freedom Scientific, 2006. http://www.freedomscientific.com.

[3] R. Atterer, M. Wnuk, and A. Schmidt. Knowing the user's every move - user activity tracking for website usability evaluation and implicit interaction. In *Proc. of the 15th Intl. Conf. on World Wide Web (WWW '06)*, pages 203–212, 2006.

[4] J. P. Bigham and R. E. Ladner. Accessmonkey: A collaborative scripting framework for web users and developers. In *Proc. of the Intl. Cross-Disciplinary Conf. on Web Accessibility (W4A '07)*, 2007.

[5] J. Mankoff, H. Fait, and T. Tran. Is your web page accessible?: a comparative study of methods for assessing web page accessibility for the blind. In *Proc. of the SIGCHI Conf. on Human Factors in Computing Systems (CHI '05)*, pages 41–50, 2005.