WebAnywhere: A Screen Reading Interface for the Web on Any Computer

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ABSTRACT

Fulfilling the promise of a web-enabled global community means enabling blind web users to access their information and collaborative web services wherever they happen to be on whatever computer to which they happen to have access. Whether they're checking their email at a local internet café, using an airport kiosk to connect with a new business contact on a social networking site, or collaboratively editing a document in a hotel business center, blind web users need to stay connected to be successful. While web-enabled computers are everywhere, screen readers are installed on very few. Downloading and installing new software can take a long time and is difficult without a screen reading interface, and many will not allow users to download and install new software at all. Accessible mobile devices are prohibitively expensive. *WebAnywhere* is a free screen-reading web application capable of making the web accessible to blind users on any web-enabled computer or device, regardless of platform or browser used, without installing new software.

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

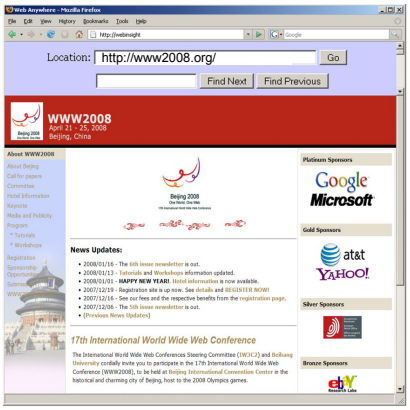
Design, Human Factors

Keywords

Screen Reader, Web Accessibility, Blind Users

1. INTRODUCTION

People often access the web on computers that are not their own. From terminals in public libraries to the local gym, from Internet cafés to pay-per-use computers at the airport, from a friend's laptop to a school laboratory; web access is vital for such tasks as checking email, viewing the bus schedule or finding a restaurant. The ease of use of web mail and document editors has not surpassed their 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. The WebAnywhere [1] web-based screen reader enables access from any computer with a standard web browser and the ability to play sound.



Popular screen readers such as JAWS [1] or Window-Eyes[2] are expensive, special-purpose software programs and are seldom installed on public terminals or other computers not normally used by blind individuals. Both the NVDA screen reader[3] and the Fire Vox screen reading Firefox extension[4] are free, but neither is likely 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. PDA solutions such as Braille Sense[5] cost roughly $5000. A smartphone with the screen reading software Mobile Speak Pocket[6] costs about $1000. Many cannot afford or would prefer not to carry such expensive devices. The Serotek System Access To Go (SA-to-Go)[7] screen reader can be downloaded via a speech-enabled web page, but the program requires Windows, Internet Ex-

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[1] www.freedomscientific.com
[2] www.gwmicro.com/Window-Eyes/
[3] www.nvda-project.org/
[4] www.firevox.clcworld.net/
[5] www.gwmicro.com/Braille_Sense/
[6] www.codefactory.es/
[7] www.serotek.com/

Figure 1: A blind screen reader user accesses his email using WebAnywhere from a library computer with no traditional screen reader installed.

plorer, and permission to run executables on the computer. The AIR Foundation has recently made this product free[8]. Using SA-to-Go requires downloading more than 10 MB of data, compared with less than 100 kB for WebAnywhere. Because WebAnywhere becomes usable in seconds compared to the minutes or more required by SA-to-Go, WebAnywhere might be more appropriate for quick tasks even on computers on which the SA-to-Go executable can run.

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 web pages, skipping by paragraph, sentence, word or character. They can quickly navigate between tab-indexed elements, heading elements, form elements, links and table rows and columns 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 provided by the browser when possible. The system is simply a web page run with standard permissions and, therefore, does not have access to the interface of the browser. Instead, it replicates needed functionality, such as the location bar and search box. WebAnywhere observes user actions in order to provide a new self-voicing, web-based browser within the existing browser.

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 [2], 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. WebAnywhere could provide this functionality anywhere.

2. ENABLING ANYWHERE ACCESS

The ability of WebAnywhere to provide a screen-reading interface on almost any computer comes from its unique design. WebAnywhere runs as a web application in existing web browsers with no special permissions. To support this, the Text to Speech (TTS) service runs on a remote server in order 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 web proxy that makes web pages appear to come from a local server to overcome cross-site scripting restrictions.

WebAnywhere plays sounds using the SoundManager 2 Flash Object[9]. Adobe reports that 98.8% of desktops have Flash installed[10]. WebAnywhere also supports embedded sound players for increased compatibility. In a small study over five web pages, the latency of retrieving each new multi-word sound was less than 300 ms on a high-bandwidth connection. The system prefetches sounds based on a model of what users are likely to request be read next, which reduces latency by nearly 20%. The sound files that are retrieved are cached and most sounds previously played can be retrieved immediately. In a survey of 15 public computer terminals in the Seattle area, 14 would have enabled blind web users to access the Internet using WebAnywhere (9 required headphones). The computer on which WebAnywhere did not work had a malfunctioning sound card. More than half of these computers did not let users install new software and one ran the OS X operating system.

WebAnywhere has been developed with consultation of blind web users who have been overwhelmingly enthusiastic about the system. In user evaluation of the system, eight blind participants (4 female) could effectively and independently browse the web using WebAnywhere. During this evaluation, participants were asked to perform four tasks: check a *gmail.com* email account, find the next arrival time at a particular bus stop, look up the phone number for a local restaurant and complete a survey about WebAnywhere. All of our participants were able to successfully complete these tasks. None of our participants mentioned concerns about the responsiveness of the system, a testament to our aggressive prefetching and caching strategies.

3. FUTURE WORK

Future versions of WebAnywhere will seek to implement more of the features offered by commercially-available screen readers as requested by our users. We also hope to leverage the unique characteristics of WebAnywhere in order to iterate quickly to improve upon what has become the standard screen reading interface. We will release WebAnywhere as a public alpha release in May 2008.

4. ACKNOWLEDGEMENTS

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5. REFERENCES

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[2] Mankoff *et al.* Is your web page accessible?: a comparative study of methods for assessing web page accessibility for the blind. CHI 2005.

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[9] www.schillmania.com/projects/soundmanager2/

[10] www.adobe.com/products/player_census/flashplayer/