

## **Accessibility Evaluation of Access Grid 2.2**

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During the week of June 28<sup>th</sup>, 2004, The National Center for Supercomputing Applications ACCESS facility (NCSA-ACCESS) hosted two National Science Foundation (NSF) interns, Mr. Min Li and Mr. Charles McLennan. The two interns are a part of the AAPD (American Association for Persons with Disabilities)/Microsoft IT program. Charles McLennan is blind and Min Li is deaf. Tom Coffin, the Technical Coordinator at NCSA-ACCESS proposed that the NSF interns develop an accessibility study of the AccessGrid (AG) technology presently under development at The Mathematics and Computer Science Division of the Argonne National Laboratory. The study consisted of an accessibility evaluation of the AG 2.2 Beta software by Charles McLennan using JAWS 5.0. JAWS 5.0 is “the most popular screen reader worldwide, JAWS® for Windows works with your PC to provide access to today’s software applications and the Internet. With its internal software speech synthesizer and the computer’s sound card, information from the screen is read aloud, providing technology to access a wide variety of information, education and job related applications.”<sup>1</sup> The interface of the AG2.2 ‘Venue Client’ and the ‘RAT (Robust Audio Tool)’ in particular were addressed using JAWS. A study of various audio to text options were researched for use with the AG. An accessibility evaluation of a live conference between NCSA and ONR (The Office of Naval Research) was also conducted. This paper concludes with suggestions and recommendations for improvements to the AccessGrid interface and overall system.

### **Accessibility Evaluation of the AccessGrid Using JAWS**

Opening the Access Grid 2.2 Beta software is easy to do with the keyboard. This is the same as most any other program that places its’ program in the start menu of Windows. With the press of a few keys, the ‘Venue Client’ can be opened. Once the ‘Venue Client’ is opened, a few more key presses will connect you to a venue if it is configured in the ‘My Venues’ menu. None of the buttons, text fields, or graphics are labeled. If you use the JAWS cursor to read what is on the immediate screen, you can read the text in the current view; however, there is much more data in the ‘Venue Client’ which is available through scrolling. This information cannot be read because the JAWS cursor locks the screen in place, like a screen snapshot. The graphics are only announced as graphic and a number, so you do not know what the graphic is or what it will do if you click on it. Labeling the text fields, buttons, and graphics would greatly enhance the usability of the ‘Venue Client’ for people that use a screen reader. As for the menu bar, JAWS can read everything in there. Even going into the “Edit Preferences” option, JAWS can read all the fields, text in the fields, and the buttons. The way the preference window was designed should be a guide for all other windows of the AccessGrid 2.2 program. The venue address is deceptive because it reads as a very long web URL with many numbers. It is not descriptive of which venue it is associated with. None of the information below the address bar was accessible through JAWS. Currently, without the

assistance from a person with sight, a non-sighted person would not be able to navigate and use the 'Venue Client' since you do not know what things are, where they are, or what they will do.

The RAT v4.2.22 is not accessible by means of the standard cursor of the screen reader. None of the buttons, text fields, or graphics, is labeled. The screen reader cannot focus on them and read them. The JAWS cursor is needed to navigate the RAT interface window to figure out what is on the screen. The buttons and arrows are announced as graphics and not as buttons. It is not possible to know what the graphics are unless someone with sight can describe them to you and tell you what they do. The arrows themselves cannot be activated with the mouse or enter keys. The slider bars to adjust the volume and gain cannot even be seen with the JAWS cursor, making it impossible for the volume or gain to be adjusted. The listen and talk buttons do not inform you if they are checked or unchecked when you click on them. The three buttons at the bottom left of the screen are only announced as graphics, and if the first two are selected it does not declare what their function is. The third button, which enables/disables the balloon tips is a major problem if activated because once the balloon tip is on the screen, it blocks out the main RAT screen, leaving the user unable to read and click on any of the buttons. The 'Option' button when selected will take you to your 'Preferences'. The settings can be read with the JAWS cursor like the main RAT screen, however, a user is unable to make any changes to the settings. The 'Apply' and 'Cancel' buttons can be activated with the left mouse key, but it would be convenient to have hot keys such as 'a' and 'c' to automatically activate them. All the fields and buttons need labels so you can tell what they are, but more importantly, a user needs to be able to make changes to the 'Preferences' as needed. The 'About' button does nothing when you press the left mouse key on it, so it is not possible get any information about the program. Lastly, the 'Quit' button will close the RAT program if it is selected with the left mouse key. These three buttons need to be labeled in order for the standard cursor to announce what they are. A user should be able to activate them with the enter key, and they need to have hot keys so that a user can just press that key from anywhere on the screen. In conclusion, this program needs to be reprogrammed so all the buttons, edit fields, slider bars, and arrows can be labeled, activated with both the enter key and hot keys, and there should be a menu bar with options like most programs in order to make it accessible to people with disabilities that do not allow them to see the screen and/or use the mouse.

To summarize the Accessibility evaluation of the AccessGrid 2.2 using JAWS

- Label all graphics, text and edit fields, and buttons/check boxes/combo boxes
- Create hot keys for all buttons for faster access
- Make sure the tab indexes are set and in order of use
- All buttons should be able to be activated with the enter key
- Slider bars need to be labeled and accessible with the keyboard as in the Windows 'Volume Control'
- Check boxes should announce if they are checked or unchecked
- Balloon tips should be off to the side so they do not cover the main window
- Menu bars need to be created in order to see what the program can do and what changes can be made

- Radio buttons and check boxes should announce what number they are such as 1 of 3, 2 of 6, and so on.
- Microphone and speaker buttons should say if they are muted or not
- Address bars and dialog boxes should be short and precise describing what they are
- Make sure all microphones are set to the same volume level
- Use noise reduction microphones to reduce background noises.
- Make sure conference rooms have the proper acoustics
- Use a security system to prevent others from entering a meeting and distracting the speaker and listeners.

Attached below is a step-by-step exercise of using the AccessGrid 2.2 with JAWS5.0

### **Accessibility Evaluation of the AccessGrid for the Hearing Impaired**

Because the AccessGrid interface is visual, the usability of the 'Venue Client' interface in the AccessGrid is equivalent to a person without a hearing impairment. However, for a deaf computer user, there is no use for the 'RAT' application without captioning services or possibly speech recognition.

Captioning is a service, which enlists a "stenocaptioner". Using a special stenographic keyboard to type as many as 250 words per minute a "stenocaptioner" can capture conversations as they occur in real time. A computer program then translates the 'steno' into English text, which is formatted as captions. Captioning is most noted in television broadcasting, movies and also in legal settings such as courtroom or congressional hearings. There are two different kinds of captions offered; open captions and closed captions. Open captions are a permanent part of the picture, and can not be turned off. The captions look much like watching subtitling of foreign language films. Moreover, it is not decoded by the television set. Closed captions are encoded and inserted into line 21 of the video signal for broadcasting purposes. It is a legal requirement in the United States for pre-recorded television programs. All television set factories are required to contain the hardware to display captions for deaf and hard of hearing people. The TRACE Center<sup>2</sup>, of the College of Engineering at the University of Wisconsin offers limited captioning services for the AccessGrid research community.

Speech Recognition is not considered advanced enough to use legally in the courts to replace stenographic recording. There are many software companies working on speech recognition software. For experimental purposes, a demonstration of ScanSoft's<sup>3</sup> VoCon-3200 speech recognition engine was used in conjunction with the 'RAT' application. The demonstration provided phrases, which, when repeated aloud would be understood and subsequently translated by the program. The success of this experiment was limited. With fine tuning of the audio levels it was possible for the software to recognize phrases broadcasted by the 'RAT'. This crude experiment shows that it is possible for speech recognition to function.

## **Accessibility Evaluation of a Live Conference Using the AccessGrid**

On Wednesday, June 30<sup>th</sup>, 2004 the NSF interns participated in an AccessGrid meeting involving NCSA TRECC program and the ONR (Office of Naval Research). Below are their comments on the live conference using the Accessgrid.

From Charles McLennan:

The auditory aspect of a live conference is extremely good as long as people describe all of the visual aspects. Voices were very clear; however, I did notice some were louder than others, some sounded as if in a non-carpeted room that gave a empty room sound effect, and they all picked up the background sounds of paper crinkling, computers starting up, and other such noises. At the beginning of the meeting, someone entered the server that did not belong and their sounds were echoing behind the speaker. This was a distraction because it made it hard to hear and comprehend what the speaker was saying. I would recommend that some kind of noise reduction was used to stop the pickup of background noises. A security program should be implemented to avoid the problem with people dropping into the meeting. Operators of the AccessGrid should make sure everyone is on the same volume level. Participants should speak clear, enunciate, and be descriptive of anything visual. Overall, this would be extremely useful for a blind user to participate in a group meeting where all the participants were scattered throughout the world.

From Min Li:

The 'VIC' interface showed, through multiple video streams, that there were several people at two locations talking with each other. However the interface failed to provide me with the content of their discussion because as being a deaf computer user, it is not possible for me to hear the audio. The AccessGrid software does not include a speech recognition program to enable the content of the conversations. Also, this meeting did not provide a captioning service.

## **Reference Materials**

### **Links Referenced**

- 1- [http://www.freedomscientific.com/fs\\_products/software\\_jaws.asp](http://www.freedomscientific.com/fs_products/software_jaws.asp)
- 2- <http://trace.wisc.edu/>
- 3- <http://www.lhsl.com/automotive/vocon3200/>

### **Step by Step exercise of using the Accessgrid with JAWS5.0**

Tuesday, June 29, 2004

Opening the Access Grid with JAWS and only the Keyboard

1. press the windows key.
2. Press p for programs
3. Press a until Access Grid Toolkit 2.2 submenu is highlighted.
4. Press the enter key to open the access grid sub menu.
5. Press v until venue client is highlighted.

6. Press the enter key to open access grid.
7. In the edit field, type the required pass-phrase
8. Press the tab key to Okay.
9. Press the enter key.
10. Press the alt key to open the menu bar.
11. Press the right arrow key to My Venues.
12. Press the up arrow key to Institution Lobby.
13. Press the enter key.

*Note. This was only available to the tester because the venue had been saved prior to the arrival of the tester. None of the portals to any of the Institutional venues were accessible through JAWS.*

#### Accessing the RAT window

1. Press the alt+tab keys until RAT V4.2.22: Institution Lobby is highlighted.
- Note. JAWS cannot read any of the buttons in this window; therefore you need to use the JAWS cursor.*
2. Press the insert+minus sign keys on the numpad to route the PC cursor to the JAWS cursor.
  3. Use the arrow keys to navigate this window.
  4. There may be 10 or more lines of information and buttons that JAWS reads.

These are from top to bottom:

- (Graphic 963) RAT V4.2.22: Institution Lobby
- Listen (button) (numbers from 0.0 to 256.0) kb/s Talk (button) (numbers from 0.0 to 256.0) kb/s
- (Graphic 198) Speaker (Graphic 547) Vol 48 (198) Line In (Graphic 547) Gain 43
- (Scroll Up Symbol) access
- access p2
- Glasgow Compserv
- (Scroll Down Symbol)
- "Institution Lobby"
- Address: 233.2.171.254 Port: 60000 TTL: 127
- (Graphic 431) (Graphic 984) (Graphic 582) Options... (Button) About... (Button) Quit (Button)

*Notes. Items in () are not text on the screen, but buttons or graphics that is announced by JAWS. (numbers from 0.0 to 256.0) is the amount of data transferring through the system from either the speakers or microphone. The numbers may be more than 256.0. The line that has the graphics, Speaker, Vol 48, Line In, Gain 48 may have different text because these are check boxes and can be changed. The graphic to the left and right of Speaker are arrows that cannot be activated with the keyboard. There are slider bars under the line with graphics, Speaker, Vol... to adjust the volume and gain; however, they are not announced by JAWS and cannot be adjusted with the keyboard. There may be more or less than 10 lines because there may be more than 1 person logged into the service. The name to the right of scroll up is your user name. Glasgow Compserv is the name of someone logged in, so this text may change as others log in and out. There may be also more than 1 line of text if there is more than 1 user*

*logged in. The line with 3 graphics, options..., and about... is not actually the last line of the program window. Unfortunately, the JAWS cursor locks the screen so you cannot move the screen to the left, right, up, or down.*

5. Either press the up or down arrow key until you get to the line with the listen and talk buttons.

6. Press either the control+right or left arrow keys until you land on the listen button.

7. Press the left mouse key to mute the person or persons on the other end of the speakers. The left mouse key is the slash key on the numpad.

*Note. They will still be able to hear you, but you will not be able to hear them.*

8. Press the left mouse key again to un-mute the speakers.

9. Press the control+right arrow keys until you land on the talk button.

10. Press the left mouse key to mute your microphone.

*Note. You will still be able to hear the others through the speakers; however, they will not be able to hear you.*

11. Press the left mouse key to un-mute your microphone.

12. Press the control+right arrow keys until you land on "Speaker".

*Note. "Speaker" is the first text area after the graphic.*

*The graphic symbol to the left of the speaker does not change if you press the left mouse key on it.*

13. Press the control+right arrow keys until you land on "Vol".

*Note. The graphic symbol to the right of the speaker does not change if you press the left mouse key on it.*

14. Press the control+right arrow keys until you land on "Line".

15. Press the control+left arrow keys once until you land on the graphic to the left of Line.

*Note. Pressing the left mouse key on this graphic will change the "Line In" to one of four options. These options are: "Line In", "Stereo", "Microphone", and "CD Audio". The "Stereo" option will cause the system to go into Multimode, which will cause feedback, echoes, and the volume becomes much louder on the other end. "Microphone" and "CD Audio" will turn off your capability to talk to the others; however, you will be able to hear them. "Line In" is the option you need checked in order to talk and listen to others.*

16. If "Line In" is not checked, press the control+left arrow keys once to the graphic to the left.

17. Press the left mouse key.

18. Press the control+right arrow keys once to hear what option is checked.

*Note. If "Line In" is still not checked, repeat steps 16 through 18.*

*The graphic to the right of "Line In" will reverse the rotation of these 4 options; thusly, they will be as follows if you press the left mouse key on them: "Line In", "CD Audio", "Microphone", and "Stereo". There are slider bars for both the volume and gain; however, they are not accessible with the keyboard and JAWS. The name to the right of the scroll up symbol is your log in name.*

19. Press the down arrow key twice.

*Note. This is the first line of who is connected. There may be several more lines down of names or E-mail addresses of people who are connected.*

20. Press the down arrow key until “Institution Lobby” is announced.  
*Note. This is the venue that you are logged into. This may be different if you logged into a different venue.*
21. Press the down arrow key once.  
*Note. This is the address of the server you are connected to. The port you are connected to on the server. TTL stands for Time To Live which is what number you are connected.*
22. Press the down arrow key once to the line with 3 graphics, options..., and about...
23. Press the control+left or right arrow keys until you are on the first graphic from the left.  
*Note. The first graphic from the left is a picture of a disk, so it probably saves your settings; however, if you press the left mouse key, nothing happens that is noticeable. The second graphic from the left is a resolution button. If you press the left mouse key on this, you will mess up the screen so you cannot access any of the buttons on the screen. The third graphic from the left is the balloon tip enable/disable button. If you enable this button by pressing the left mouse key while on it, a balloon window will pop up with a tip in it; however, once this happens, you will not be able to access any of the buttons because they are now behind the balloon tip.*
24. Press the control+right arrow keys until you are on Options...
25. Press the left mouse key to open your preferences.
26. Press the up arrow key until you get to (graphic 963) Preferences
27. Press the down arrow key to read all the lines on this screen.  
*Note. This tells you what the category you are in, your user name, E-mail address, phone number, where you are located, and a note that the other users can read. However, you will not be able to make any changes to this window.*
28. Press the down arrow key until you get to the last line which has apply (button) cancel (button).  
*Note. This will allow you to apply these settings or cancel the settings.*
29. Press the control+right arrow keys until you land on cancel button.
30. Press the left mouse key to close this window.
31. Press the up arrow key several times to get back into the regular window.
32. Press the down arrow key until you get back onto the line with the 3 graphics and the buttons.
33. Press the control+left or right arrow keys until you get to the about... button.  
*Note. If you press the left mouse button, nothing seems to happen.*
34. Press the control+right keys to the quit button.  
*Note. If you press the left mouse key on this button, you will close the RAT window.*