

Emacspeak
Direct Speech Access

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Outline

- Problem overview.
- Speech enabling applications.
- Emacspeak –Architecture.
- Emacspeak –The user experience.
- WWW access and speech style-sheets.



Screen Access

Applications provide *visual* feedback.

Screen-access renders this feedback aurally.

User explores visual display to:

- Construct a mental model of the interface.
- And interpret intent of the UI.

Aural output –Consequence of the visual display.



Screen Access Design

Goal –Speak visual display.

Steps:

- Encapsulate screen appearance in an off-screen model.
- Present this model aurally.
- Enable navigation of this model.

Aural feedback is application independent.



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Available Screen Access

Character-based interfaces . . . GUI.



Screen Access Innovations

Innovations include:

- Application specific customizations.
 - Speak specific areas of the screen.
 - Attach meaningful labels to icons.
- Navigate window hierarchy instead of geometric layout.

Access separate from application.



What Is UI?

Applications:

1. Obtain user input
2. Compute on the information
3. Display the results

UI = Input + Output



Speech Enabling Applications

- Treat speech as a first class medium.
- Application produces its own feedback.
- Exploit features of the spoken medium.
- Context-specific, *audio formatted* output.

Aural feedback independent of visual display.



Contrasting Approaches

Screen Reading	Speech Enabling
Speak display	Speak information
Minimal context	Contextual feedback
Application independent	Tightly integrated
Global context	Application context
Examines display	Examines environment



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Advantages

Speech enabled applications:

- Produce intuitive feedback.
- Provide a simpler user model.
- Reduces users cognitive load.

User works with *one* –not two– applications.



Example

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Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Easy to see relevant information.



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EMACS

A customizable, extensible user environment:

- Editing and browsing electronic information
 - WWW, Email and Usenet.
- Software development.
 - Code browser and debugger.

Unified interface enables cooperating applications.



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Emacspeak

Speech enables all of GNU Emacs 19.

Using Emacs' extension mechanism:

- Device independent interface to speech hardware.
- Core modules for basic spoken feedback.
- Extensions for various applications.

Does not *modify* Emacs code-base.



Advice Overview

Advice can extend or modify existing code.

BEFORE Called *before* advised function.

AFTER Called *after* advised function.

AROUND Called *instead of* advised function.

Advice enables code re-use.



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Advice

Let $x \rightarrow f \rightarrow y$.

Advice fragments

BEFORE

AROUND

AFTER

Result in function f'

$x \rightarrow \underbrace{f}_{f'} \rightarrow y'$

That computes y' .



The User Experience

Emacspeak provides feedback as you work:

- Succinct contextual speech feedback.
- Auditory icons augment interaction.
- User action flushes prior speech *immediately*.
- *Audio formatting* provides rich feedback.

User focuses on task at hand.



Demonstration –Editing

- Simple editing, search and replace.
- Completion and spell checking.
- Syntax coloring using *voice-lock* mode.
- Comparing files.

Intuitive interface enables fluent interaction.



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Demonstration –Browsing Information

- Browsing the file system.
- Reading and responding to email.
- Browsing Usenet news.
- Browsing the WWW.

An integrated window into digital information.



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WWW –Speech Style Sheets

Cascaded speech style-sheet specifies:

- Voice properties for document elements.
- Amount of pause around document elements.
- Auditory icons for document elements.
- Background audio for document elements.

Generate richly formatted *audio* documents.



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Demonstration –System Tasks

- Running a shell.
- Running terminal based applications.

Behaves like a traditional screen-reader.



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Device Independent Speech

TCL scripts interface to different speech devices.

Implemented interfaces include:

- Dectalk Express
- MultiVoice
- Software Dectalk –DEC-ALPHA
- DECFACE –A Talking Face

Supporting other devices is straightforward



Core Modules

Basic audio services used to advise

- Navigation commands e.g., forward-word, next-line, . . .
- Editing commands e.g., typing, deleting . . .
- Prompting commands –functions that ask questions.
- File and buffer manipulation commands.

Sufficient to implement a working system.



Application Specific Extensions

The icing on the cake!

- Calendar
- Spell checker
- Mail and News reader
- WWW browser

Extension code-size is less than 1% of original.



Advice Statistics

Package	Code	Extension	Percent	Advice
Core	217,295	3,152	1.45%	188
W3	17,384	515	2.96%	12
Mail	17,943	270	1.50%	14
GNUS	35,528	501	1.41%	37

Emacspeak –A model of code re-use.



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Conclusion

- Treat speech I/O as a first-class medium.
- Shows advantage of separating UI and computation.
- Enables rich, well-structured interfaces.

