

A Comparative Study on Speech Output System “Emacspeak”

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Abstract

Speech output system for person with disabilities emerged as a powerful tool. A direct speech access system “Emacspeak” provides this feature. It is a well-developed speech output interface. Quality-wise Emacspeak is different from traditional screen readers based applications as it makes application speak. Basically, it is a full-fledged system for one who can't see to allow speech output. The foundation of Emacspeak is Emacs which helps the user by generating set of spoken feedbacks. In this paper all the versions of Emacspeak is thoroughly studied to identify the future scope and improvements.

Keywords: Direct Access, Speech Interface, Spoken Feedback

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1. Introduction

Emacspeak emerged as a functional utility with audio facilities for 32 and 64-bit desktop operating environments. It provides an eyes-free access to all the major desktop applications. The audio desktop framework of Emacspeak provides access to the Internet based applications such as surfing web, blogging, social networking, and communication through electronic messaging application. It enables a seamless access to user remotely through a reliable and well-structured interface. Emacspeak consists of task-oriented tools which provide well-organized speech-enabled access to the Internet based social services. Table 1 below lists the major version details of Emacspeak year by year.

The Emacspeak provides an environment where each typed character is pronounced and space-bar pronounces the previous word typed. Also, Cursor is very helpful in usage of file, through a cursor each line of a file speaks, but if the cursor is moved from that line the speak functionality of that line is interrupted and stopped. It helps the user to browse files efficiently.

The Emacspeak is design and developed with the following motivational goals:

- To maintain independence of the device.
- To provide a primary services for the audio desktop.
- To provide extensions to the primary services depending upon applications.

- To realize Emacspeak without changing the code base of Emacs.

Table 1. Related Literature Survey Summary

S. No.	Inventor Name	Version Details	Invention Year
1.	T.V. RAMAN	43.0(Sound Dog)	Nov, 2015
2.	T.V. RAMAN	42.0(Answer Dog)	May,2015
3.	T.V. RAMAN	41.0(Nice Dog)	Nov, 2014
4.	T.V. RAMAN	40.0(Wow Dog)	May, 2014
5.	T.V. RAMAN	39.0(Big Dog)	Nov,2013
6.	T.V. RAMAN	38.0(Free Dog)	May,2013
7.	T.V. RAMAN	37.0(Solid Dog)	Dec,2012
8.	T.V. RAMAN	36.0(Epub Dog)	May,2011
9.	T.V. RAMAN	34.0(Bubbles)	May,2011
10.	T.V. RAMAN	33.0(Star Dog)	Nov,2010

1.1 Implementation

Emacspeak follows a layered architecture where every layer is lying on some components. But, the lowest layers of Emacspeak are independent of the device. At present the Emacspeak consists of a speech server which has been implemented in Tool Command

Language (TCL). It enables the speech device to communicate. This architecture of Emacspeak follows a client-server mapping for the purpose of speech generation independently to the device. So, to make the hardware work, a device-specific script has been executed on the device to work as a device driver whereas in case of software using TCL shell speech synthesizer and Application Programming Interface (API) calls are directly implemented. It results an independent structure where Emacspeak functions without background inference. Hence, speech clients are independent of the script language and APIs, TCL implements the speech server firmly. The Table 1 shown above shows the main core technologies for literature survey, showing the versions of improvement in core technologies.

If we consider table 2 and observe different versions, we notice that from version 33 to 43 many advancements are made like in version 34 these files were included:

- pianobar.el: It is a radio named as 'Pandora' for the desktop),
- dbus.el: It receives network notifications on the desktop,
- librivox.el: It provides various API clients for free audio books.

These features were not present in the early versions. If we observe version 37 we see the new features like: Text-to Speech (TTS) enhancements, Secure Shell (SSH) port forwarding support for TTS servers and web search enhancements.

In the version 39 a feature called emacspeak-feeds was added, this feature enables rapid access to managing and accessing Atom, RSS and OPML feeds. Feeds can be browsed from a dedicated buffer, or accessed via minibuffer completion for oft-accessed feeds. Lastly, in the version 43 which is the latest technology, advancements consist of:-

- For efficient communication multiples of TTS streams are located spatially,
- Sound themes are re-factored and improved,
- Org-mode support has been updated,
- Helm package to enable speech has been included,
- Using emacspeak-muggles package shortcuts for context-sensitive keyboard has been enabled,
- Speech mode has been enabled in lua-mode for LUA programming.

1.2 Primary Services

The primary services play a significant roles and proven Emacspeak adequate to implement the audio desktop. This encourages reusability of code to design a fine set of primary services that infuse in the environment. The primary services of Emacspeak ensure a consistency in the sound and feel on the audio desktop. The desktop of Emacspeak consists of various groups of modules categorized as:

- A ground-level interface.

- Fundamental services for producing speech and non-speech acoustic icons which enables an improved acoustic display.
- Extensions for various applications which uses fundamental services of the acoustic display using Emacspeak platform.

The next section emphasizes on the core technologies emerged in the Emacspeak, emphasizing towards its various versions and enhancements.

2. Core Technologies

2.1 Emacspeak33.0 (Star dog)

Star Dog brings incomparable access to Internet for the audio desktop. This version came in 2010¹. Various enhancements made in this version are:

- For rapid access of Web updated Unifrom Resource Locator (URL) Templates has been added,
- Login modules included using OAuth which provides support for twittering-mode,
- Using org-mode publishing enabled by updating 'Google docs',
- An enhanced BBC iPlayer support.

2.2 Emacspeak34.0 (Bubbles)

It launched a new bridge-headed Emacspeak in order to perform task in the environment of audio desktop hassle free. This version released in 2011². Enhancements made in this version are:

- Login modules included using OAuth which provides support for twittering-mode,
- For National Public Radio(NPR) programming various API Client has been included,
- Also, Librivox API client has been included with Emacs 24 support,
- For Mac operating system Speech server support added.

2.3 Emacspeak 36.0 (EPub dog)

This version of Emacspeak improves the desktop with so many of modern tools which include a complete support of EPub, and therefore it entitled as EPub Dog³. This version also came in 2011. Enhancements made in this version are:

- A complete support of EPub,
- Enhancements of searching web and its various wizards,
- Enabling speech interaction through magit,
- Enhancing fast search by enabling speech support,
- Enhancing TTS to get support from SSH port.
- URLs has been updated for various task-oriented web actions,

2.4 Emacspeak37.0 (Solid dog)

This version continues the convention of bringing out robust Emacspeak core services suggested by the title entitled⁴. This version came in 2012. Enhancements made in this version are:

- URLs has been updated for various task-oriented web actions,
- bling speech interaction through magit,
- Speech-enables module Kite for debugging Web Apps in Chrome,
- Enhancing TTS to get support from SSH port.
- URLs has been updated for various task-oriented web actions,
- Tested against Emacs 23 on stock Ubuntu Lucid and precise

2.5 Emacspeak38.0 (Free dog)

This version of Emacspeak emerged as an award-winning release⁵. This version came in 2013. Enhancements made in this version are:

- Using Google Maps to get directions and to locate places,
- Using Eclim primary support to Eclipse has been provided,
- For browsing of code speech-enabled G-Tags has been used,
- Web search wizards and URL templates updated.

2.6 Emacspeak39.0 (Big dog)

In this version the convention followed to increase the tasks to users⁶. This version also came in 2013. Enhancements made in this version are:

- Interaction of notebook using .EIN package through speech.
- Using JSS, Chrome and Firefox improved through package Kite. This enhances the search wizards rapidly and also improves instant web access through URL templates.

2.7 Emacspeak 40.0 (Wow dog)

It is a powerful audio desktop for leveraging today's evolving data, social and service-oriented web cloud⁷. This version also came in 2014. Enhancements made in this version are:

- Efficient usage of web content using Emacs EWW,
- Smart access of Web through templates,
- gmaps.el enables finding of places and to read reviews,
- Exploration of freebase from knowledge base using 'Freebase Search'.

2.8 Emacspeak 41.0 (Nice dog)

In this version improvement is made towards superior access of technology, correctly and significant to human ability. This version came in year 2014⁸. Enhancements made in this version are:

- Smart access of web through 'emacspeak-url-templates',
- Improving Google integration using 'emacspeak-google.el',

- 'emacspeak-websearch.el' enabled in order to find things fastly.

2.9 Emacspeak 42.0 (Answer dog)

This version emerged as a powerful audio desktop as it has a control over growing data, and services over internet and cloud⁹. It has a feature of light weight internet access. This version was launched in 2015. Enhancements made in this version are:

- Updated info model, it has an audio workbench using SoX, smart web access.

3. Future Scope

With the latest in field, the Emacspeak 43.0, the Sound Dog, even though comes with sound themes but not enough to support different types of sounds and voices, so building a large set of sound themes can be an advancement in the later versions. Also, currently this desktop comes with context specific keyboards but developing a cognitive voice recognition system which interprets the words based on emotions. Research work can be carried out in order to build a better interface for user interaction. Even though the data usage has been limited to a certain extent, but it still needs to be carried forward for better usability.

We need to focus on a point for better web access than earlier versions so as to make it a reliable system for everyone to be used. This is because now Emacspeak is no more a desktop application; it has got its hands in web which needs lots of continuous updates in technology. It has to be dealt with better web searching algorithms, which can boost up the speed and improve its performance. It works on TTS algorithm which requires better voice modulation from the system which can be easily understood and interpreted. And audio streaming being its key element has to be improved in terms of quality, speed and accuracy.

The main aim now for Emacspeak is to simplify its configuration. It takes a lot of time to perform a task on this Linux based system than on a Windows based system. So this needs to be dealt at first in the coming versions. And with access to web services, security too has to be managed at extreme level, so making it more secure and giving user a safe environment to use it. With future work it can not only be made available as separate desktop, but it can also be embedded in a multipurpose desktop system as an application.

4. Conclusion

In the end we would like to conclude with the fact that Emacspeak has been proved as an efficient eye free desktop. It has not only covered personal level functionalities but has achieved its position at web level as well. Starting from a discrete level, it has been

Table 2. Comparative Study on Emacspeak

S. No.	Technology Us ed	Version number	Version name	Major enhancements	Merits
1.	Based on Linux platform	Emacspeak 43.0	SOUND DOG	Updated info model, it has an audio workbench using SoX, smart web access.	Auditorily feedback on time.
2.		Emacspeak 42.0	ANSWER DOG	- Smart access of web through 'emacspeak-url-templates,' - Improving Google integration using 'emacspeak-google.el,' 'emacspeak-websearch.el' enabled in order to find things fastly.	Auditory user interfaces and Light- weight Internet access.
3.		Emacspeak 41.0	NICE DOG	- Emacs EWW: Consume Web content efficiently. - emacspeak-websearch.el, emacspeak-google.el, gmaps.el - Freebase Search	Enhancing the human ability.
4.		Emacspeak 40.0	WOW DOG	- Emacs EWW , Freebase Search, Emacs 24.4 - emacspeak-url-templates - emacspeak-websearch.el, gmaps.el	Efficient access to web content.
5.		Emacspeak 39.0	BIG DOG	.EIN package, Emacs 24.3 support. - Using Google Maps to get directions and to locate places, - Using Eclim primary support to Eclipse has been provided - Web search wizards and URL templates updated.	Increasing the task coverage.
6		Emacspeak 38.0	FREE DOG	- Eclim support. - GTags for Global code browsing. - Emacs 24.3advice implementation.	Prominent Version
7		Emacspeak 37.0	SOLID DOG	- EPub support, magit - TTS enhancements with SSH. - Emacs 23 and 24 on stock ubuntu lucid.precise and support respectively.	A robust software.
8		Emacspeak 36.0	EPUBDOG	- EPub support ,magit - TTS enhancements with SSH. - Enhancing fast search by enabling speech support.	Complete EPub support.
9		Emacspeak 34.0	BUBBLES	- OAuth, NPR programming, - Librivox	Rapid task completion.
10		Emacspeak 33.0	STAR DOG	- twittering-mode - org-mode. - BBC iPlayer support.	Incomparable access to internet from the desktop (audio desktop.

developed to a great extent that it has a built in feature of smart access of web, parallel audio streaming, and communication over a distance and efficiently limiting the data usage. Also a worth mentioning point is its continuous availability at cheaper prices even in case of an upgrade or a degrade of technology. As Linux is its foundation, so it ensures maximum security, keeping the use of desktop simple yet secure. With better environment and scalability it keeps up with a better interface and seamless internet services. It has greatly supported in polishing human abilities and thus reaching to untouched targets in the field of science .It is also trying to grab and give it's user an experience of social media

like twitter, blogging and bringing the whole world at their sights. If given the right direction and support it can be helpful for those who need this.

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