

# EasyVoice: Integrating Voice Synthesis with Skype

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## ABSTRACT

This paper presents *EasyVoice*, a system that integrates voice synthesis with Skype. EasyVoice allows a person with voice disabilities to talk with another person located anywhere in the world, removing an important obstacle that affects these people during a phone or VoIP-based conversation.

## Categories and Subject Descriptors

K.4.2 [Social Issues]: Assistive technologies for persons with disabilities; H.4.3 [Information Systems Applications]: Communications Applications; H.5.2 [Information Interfaces and Presentation]: User Interfaces

## General Terms

Design, Human factors.

## Keywords

Voice Disabilities, Virtual Keyboards, Text-to-Speech Synthesis, Skype, VoIP.

## 1. INTRODUCTION

Voice over IP (VoIP) applications have become very popular in recent years. These applications allow people to talk for free over the Internet and also to make traditional calls through the Public-Switched Telephone Network at a small fraction of the cost offered by traditional phone companies. One of the most popular VoIP applications is Skype, which is freely available at <http://www.skype.com>.

People with voice disabilities, however, are oftentimes not able to use a VoIP application (or, as a matter of fact, a regular or mobile phone) in order to have a conversation with another person. A minor voice disability might not be a big obstacle, but for those with severe voice disabilities, a phone conversation is something almost impossible to achieve. For those cases, the only hope appears to be the utilization of

a text-to-speech (TTS) system together with a VoIP application. This solution has been hinted by ourselves in the recent past [1] and is something that to our best knowledge has not been tried before.

The utilization of speech synthesis [3] as an assistive technology allows barriers to be removed for people with a wide range of disabilities. Application examples include the use of screen-readers for people with visual impairment, as well as to help people with dyslexia and other reading difficulties. Another important utilization, as we are about to see in this paper, is to aid those with severe voice disabilities.

## 2. THE EASYVOICE SYSTEM

### 2.1 General idea

With text-to-speech, a person types at a keyboard, the text is synthesized, and the sound comes out through the computer speakers. With EasyVoice, the sound is injected directly through the network rather than being sent to the computer speakers. EasyVoice achieves this by working together with Skype via its Application Programming Interface (API) (see <https://developer.skype.com/>).

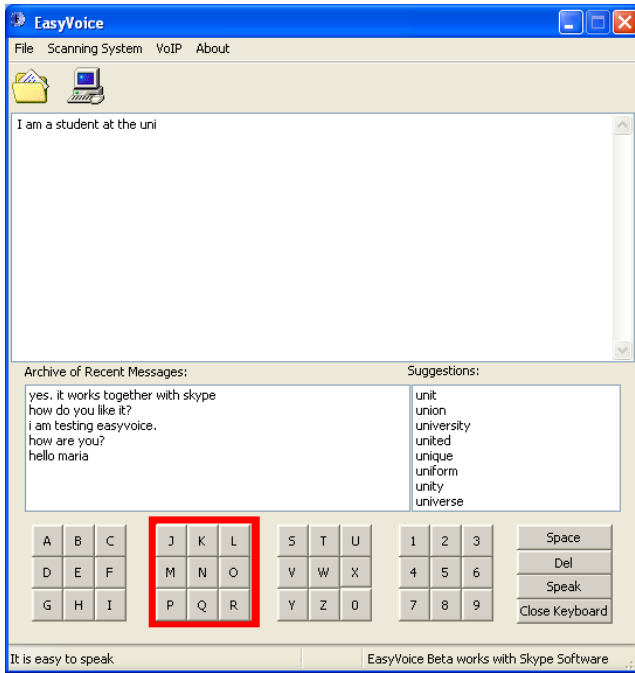
The current implementation of EasyVoice works under Microsoft Windows. It is freely available at <http://w3.ualg.pt/~pcondado/easyvoice/>. Any speech synthesizer can be used as long as it is SAPI 5 compliant. SAPI stands for Speech Application Programming Interface. It is an API developed by Microsoft to allow the use of Speech Recognition and Speech Synthesis within Windows applications.

Notice that one could think that there is no need to do any special integration between a speech synthesizer and a VoIP application. After all, one could simply use a speech synthesizer and let the computer's microphone be close enough to the computer speakers. Such a naive solution, however, yields an excessive amount of echo during the conversation because the person at the other end of the line hears back her own voice.

### 2.2 Features for slow typers

Many times, a person with voice disabilities has also motor coordination problems, and it may happen that the person types very slowly. That's often the case of people with cerebral palsy. In such cases, typing with a reasonable speed at a regular keyboard can be a difficult thing to do, and that is an obstacle for a smooth phone conversation.

To alleviate this problem, EasyVoice provides a number of features which can be used to accelerate the typing process. Although they can be very useful for slow typers, they



**Figure 1: The EasyVoice user interface. The top part shows a text panel for input. In the middle part, the left panel has the archive of recent messages, and the right panel shows the suggestions given by the word completion algorithm. The bottom part shows the virtual keyboard with its scanning system in operation.**

may not be useful at all for those with a normal typing ability. Therefore, all the features are optional and can be turned on/off by pressing a single button. The features implemented are the following:

- archive of recent messages
- word completion
- abbreviation system
- virtual keyboard

Figure 1 shows a screenshot of the EasyVoice user interface with all the features turned on. There is a text panel on the top part where the user can type. Below the text panel there are two list boxes. The one on the left part is a list of recently typed messages, and on the right part is a list of possible words given by the word completion algorithm.

The archive of recently typed messages is useful because during a conversation it is many times necessary to repeat some words or phrases. With the archive in hand, the user does not need to retype the message and can simply pick it from the list again.

The word completion algorithm searches in a built-in dictionary for those words that have as a prefix the sequence of letters typed by the user so far. The system gives a list of the 8 most frequent words of the language, which were obtained by the British National Corpus (see <http://www.kilgarriff.co.uk/bnc-readme.html>).

Another important feature is the abbreviation system. It is common for people to use abbreviations when writing. For

example, in English it is common for people to use “**btw**” as an abbreviation of “**by the way**”. Within EasyVoice, the user can define his own abbreviations and the system automatically replaces each abbreviation by the corresponding words, before sending it to the speech synthesizer.

The final feature is a virtual keyboard with a scanning system incorporated. Many individuals cannot control their hands with enough accuracy to use a regular computer keyboard, and sometimes only have the ability to control a single touch button. Virtual keyboards are a reasonable solution to solve some of these limitations. With a scanning system, a set of options is presented to the user on the computer screen, and a visual cursor advances through the options, one at a time, at a specified time rate. The user responds by pressing a touch button whenever the cursor is on top of the desired option. Sometimes an option is just a container for more options and is referred to as a *group option*. When a group option is selected, the scanning system immediately focuses on the sub-options of that group, and again, advances the visual cursor through each of them [2].

### 3. CONCLUSIONS AND FUTURE WORK

This paper presented EasyVoice, a system that combines existing technologies in a novel way for helping people with voice disabilities.

User interfaces for people with disabilities, speech synthesizers, and VoIP applications, are technologies that already existed for quite some time. What we did was to marry them together, and by doing that, we believe we have created an innovation, something that did not exist before and that opens a window for a new world of communications, learning, and socialization, for people with voice disabilities.

We have done preliminary usability tests with 3 people with cerebral palsy, all of them having voice disabilities. For future work, we plan to conduct usability tests with a larger population, incorporate voice synthesizers for other languages, design alternative user interfaces for people with very severe motor disabilities, and port EasyVoice to other operating systems, namely MacOS and Linux.

### 4. ACKNOWLEDGMENTS

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