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ConWis: Assistive Software for People with Hearing and Speaking Disorders

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ABSTRACT

In this paper, we developed a medical computer application for both disable children and adults in order to provide the chance to communicate easily with others. Although there are many mobile healthcare apps available nowadays, we believe that users should also have many options for choosing different types of healthcare programs developed for computers. That's why we have developed ConWis. This application helps a person with hearing loss, voice, speech, or language disorder to communicate easily with others. Through this software, hearing and understanding what is being said more clearly or to express thoughts become easier. To use this software, patient should input a sentence and it will be converted to audio speech using built-in voices for man or woman. In addition to that, it can convert voice that is received by microphone into text and display it on the screen.

1. INTRODUCTION

Nowadays, low-tech Augmentative and Alternative Communication (AAC) methods are still being widely used. AAC include method of communicating that supplements (augments) or replaces (provides an alternative to) the usual methods of speech and/or writing where these are impaired or insufficient to meet the individual's needs [1]. Variety of such methods are as follows:

1. Sign language pictures (simple letter)
2. Photos
3. Symbols
4. Communication board
5. "YES" and "NO."

This program can be categorized as (AAC) device which help people with communication disorders to express themselves. ConWis program uses speech recognition to convert voices to captions for people with hearing disorders to understand what is said. And speech synthesizer is used to convert text to audio speech using built-in voices for man or woman.

2. INTERFACE AND FUNCTIONALITY

ConWis is developed in Visual Studio C# language for Windows operating systems. The layout of the application is simple and user-friendly for the person to use.

The white panel which is on the right upper corner of the interface is for displaying results of speech recognition. The initial for speech recognition is terminated. After the user starts the software, he or she can click the red button to initialize the app to hear voices and display them in text.

We used dictation grammar for this part so in order to get proper output, the person who is speaking should speak louder with clear pronunciation. In addition to that, high quality microphone is also necessary. Laptop's own microphone sometimes cannot receive smooth and clear voices.

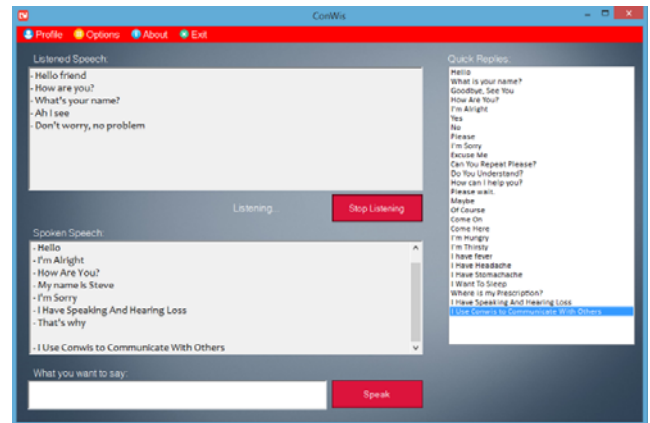


Figure 1. The main interface of ConWis

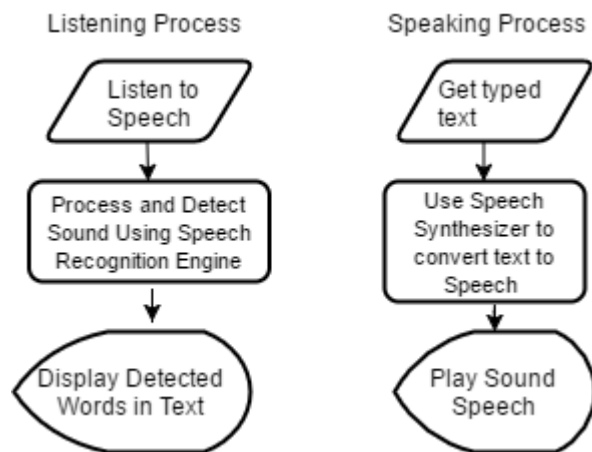


Figure 2. Process sequence

Below the Figure 3 is a form that displays the results of text-to-speech function. The user must type what he or she want to say and then click Speak button next to it. Depending on the gender of the user, application will speech that text

using built-in voice libraries. In order to speed up the communication process, we have added 2 important functionalities and they are “quick reply” and “automated reply” functions. The sentences in “quick reply” bar are fixed but the user can easily modify “automated reply” database and add different types of answers for several questions.

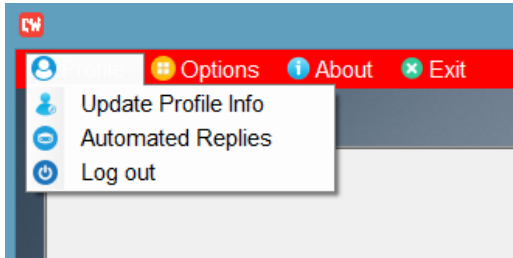


Figure 3. The main menu bar

When the user opens ConWis for the first time, it asks to create an account with basic personal details such as full name, birthdate, address and gender.



Figure 4. Registration window

All of this information will be stored offline and used in automated replies to speed up the conversation process. If the user wants to change this personal details, he or she can do it by opening the “Update Profile Info” window. We tried to develop the main menu very easy and comfortable to navigate. There is also Log Out option, just in case the user wants to terminate his or her ConWis account. This will delete all the personal information belonging to the user from the software database.

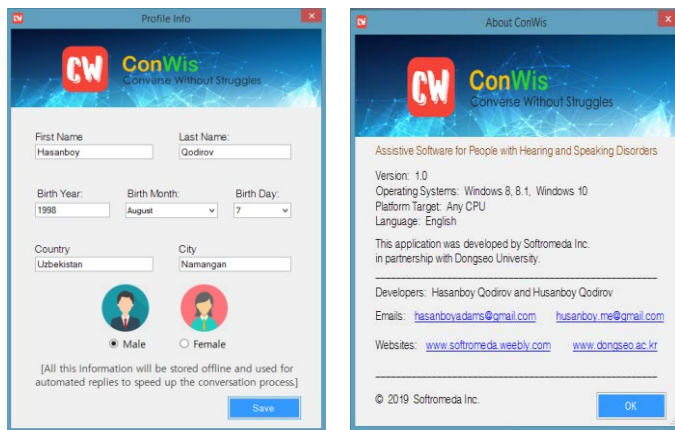


Figure 5. Profile Info menu (left) and About menu (right)

About Menu in Figure 4, we have included basic information of ConWis such as version, compatible Oss, target platform, language, some contact information and website links.

3. CONCLUSION

To sum up, by developing this medical computer application, we want to help many children and adults who are struggling to communicate in different social situations, work, home or school because of their disability to speak or hear. Recent studies show that the number of medical apps was nearly doubled since 2015. Also, 90 percent of US-based physicians use smartphones on a daily basis to work with EHRs, communicate with patients, and so on [2]. We feel proud and satisfied if we become providers and developers of high quality and useful applications of healthcare technologies.

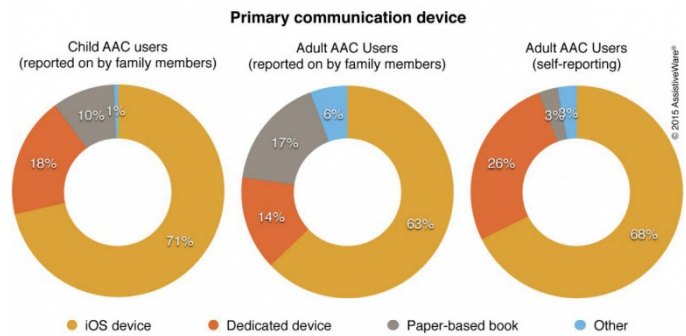


Figure 6. Primary communication device [2]

In the future, we will develop ConWis for 2 most common mobile platforms such as iOS, Android because a lot of patients prefer to use medical apps on their smartphone. We believe that medical apps make a life of patients and physicians more convenient.

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 [2] David Niemeijer, “The state of AAC in English-speaking Countries: First results from the survey.” AssisitiveWare. Accessed September 23, 2019. <https://www.assistiveware.com/blog/state-aac-english-speaking-countries-first-results-survey>