Introduction

Voice recognition devices have the ability to convert spoken words to machine-readable input, which could be extremely useful for a disabled person unable to use a keyboard. The following will discuss the commercial application of this product, how the technology works and how to implement voice recognition for disabled people.

Commercial Application

One of the main uses for voice recognition is with a PC. Voice recognition gives a disabled person the ability to write emails and browse through the web without ever using a keyboard. Even for users who are able to use a keyboard, the average typist can speak more than 120 words per minute but type less than 40 on average [1]. InfraWare speech recognition technology produced software that adapts to the user and doesn’t require the dictation of any punctuation [2]. For a disabled user, this will greatly increase efficiency and reduce frustration.

Some powered wheelchairs use voice recognition for disabled patients. For example, the Katalavox wheelchair, made by Kempf, enables the user to control movements and speed of the chair with voice recognition [3]. Through a 16KHz sampling rate, the voice recognition software will ignore ambient noise and only listen to the user [4].

How Voice Recognition Works

Voice recognition works by translating a user’s voice into a digital wave, which is then interpreted by an algorithm. This data is then interpreted by the program to do whatever the user desires, whether is he/she is operating a wheelchair or typing an e-mail.
The algorithm uses digital signal processing to translate and analyze the signal along with filtering out background noise. As mentioned above, voice recognition software is often capable of completing words or sentences without hearing the whole thing. Speech recognition is generally implemented using Voice Activity Detection (VAD) for start and end detection, as well as zero crossing method and 4th order cumulants to determine the presence of speech [5].

**Building Blocks for Implementation**

Smart and efficient hardware and software are necessary in any voice recognition system, but especially with a disabled user. The microphone, which responds to frequencies of 20 Hz to 20 KHz acts as the input and through a digital signal processing chip, which is usually programmed using C/C++, the person’s voice is translated into analyzable data. This data is then outputted through a digital/analog converter for the software to interpret. The load end of the system should have a low resistance, approximately 75-800 Ω, in order to reduce the overall system power consumption, which would be helpful in powerless CPU systems, or where the utilization of speech recognition systems has been limited by software [6].

**References**


