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# Computer control software for impaired people with voice commands

Nursel Yalcin[a]*, M. Mutlu Yapici[b]

[a]Computer Education Department, Gazi University, 06280, Ankara, Turkey
[b]Electronic-Computer Education, Gazi University, 06500, Ankara, Turkey

**Abstract**

People are having increasingly great facility by the developments in technology. Speech recognition technology also means using computer without using mouse and keyboard. This technology is very important for especially visually-impaired and physical-impaired people. Because using computer with voice commands is very easier and effective for them. And we need to this kind of softwares very much in our country. Because of this, a program is developed to control browser, media player, calculator, mouse motions, passing actions between one program to another program in taskbar and desktop properties in Windows Operating System with voice commands by using Visual Studio.Net C#. © 2011 Published by Elsevier Ltd.

*Keywords: Voice recognition, Speech recognition, Window Operating System controls with voice commands , Browser control with voice, Media player control with voice, Desktop control with voice, Computer control with voice, Software for visually-impaired and physical-impaired peoples.;*

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## 1. Introduction

Speech recognition is a system which is to acquire an important position in the developing technology. This system is also a process that is detect and recognition human voice with a microphone by computer. This process is one of the most important point in the human computer interaction. [3] With this way, people can use computer without touching keyboard and mouse. Voice recognition is technology being more important every

*ADDRESS FOR CORRESPONDENCE: Nursel, Yalçin, Computer Education Department, Gazi University, 06280 Ankara, Turkey
*E-mail address:* nyalcin@gazi.edu.tr/ Tel.: +0-312-485-1124

day. The first electronic sound synthesizer is Voder. Voder is a machine which operated with a keyboard and foot pedals to make sound. Initially, the machine was only working to talking. Since the emergence of the first computers, this work was gradually shifted towards the direction of human-machine interaction, and "speech recognition" (speech recognition) technology was born. Speech recognition system which described as a technological revolution by Microsoft has been an area under study since the late 1950s . Many devices and software through speech recognition has been made can controlled by voice commands. Management of the computer with voice commands, these studies are among the. Speech recognition technology which is used as nested in different disciplines such as Artificial Intelligence(Artificial Intelligence), Machine Learning(Machine Learning), Mathematics, Statistics, Coupling(Cognition) and Linguistics(Linguistics), also significantly benefited from the advances in electronics (microphone, sound card technology, processor speed, etc.) together with the considerable developments in disciplines mentioned above[1,2,4,7,8]. Together with the development of distributed systems, audio processing modules find increasingly broad range of use in local area networks or the Internet. In addition, distributed Speech Recognition (DCT) modules was integrated in personal computers, mobile phones and handheld computers [4,5,10].

Speech recognition problem is actually a pattern recognition. Stochastic structure of the speech signal requires the solution of statistical methods for this technology . A speech recognition model generally consists in of four stages. First one, working at signal processing module to obtain a representation of the speech recognition signal. Second one, defining the key elements of the representation and to use the feature extraction module to extract more information. Third, the to do the word detection is the use of time editing and model comparison algorithms, and the fourth, selection a language model to create the final word[3]. Values of the human voice frequency range changes between 300Hz to 3300Hz. According to the Nyquist Theorem audio frequency greater than twice the sampling frequency and sampling is done with the effective[6,9,11,12]. Therefore, the audio samples are recorded at a sampling frequency of 8kHz . Creating the speech recognition model is processes which revealing of the voice features and first one of these processes is voice recording. After the recorded audio is converted to digital data with A / D., pre-emphasis process, framing, linear predictive coding (LPC) coefficients and cepstral coefficients are found . Integration of The speech recognition system with computer technology of our age makes human's life easier. Especially studies which made for Making visual impaired and physical impaired human's life easier perform to easy and comprehensive computer using for them. There are a lot of program which was developed for people who is not able to use their hands, fingers or arms but there is not so many this kind of program for Turkish people. . In addition to this, This kind of Turkish programs was developed to control only one program as web browser [1,2,3]. The program is developed in this study don't make control to only one program. Web browser, media player, desktop's properties , calculator, folder's properties and mouse actions can be controlled with voice commands by the program. Thus, an opportunity is provided to monitor and control the technology effectively and easily for many impaired people. It is seen that physical and visually impaired people don't benefit from the advantages of technology enough in the fast-growing computer age. The developed computer programs is generally designed for normal people. Therefore physical impaired and visual impaired people are excluded from computer technology. Each day, the usability of computer have become increasingly more complex together with the each new function which was added for impaired people. In the current study, it is aimed to Making Impaired people's life easier, Making computer technologies more usable for impaired people.

## 2. Computer Control With Voice Commands

The program which is "computer controls with voice command" developed for the visually and physically impaired people to very comfortable and effective usage is designed with c sharp program which is integrated KurDikteAPIF20 application. The software developed with C # program, operation of the corresponding command is provided that through the audio signals which are received by microphone. The algorithm flow diagram which belongs to the program is described in figure 1.

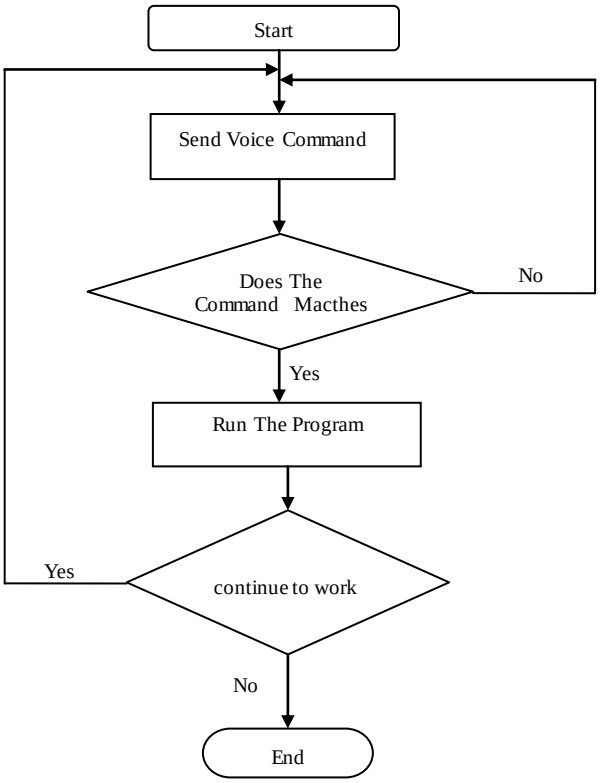


Figure 1. Voice Control Windows Program Flow Chart

The program is activated by pressing the Start button. While The program is activated, it is run the desired process with the voice command given through the microphone. If the voice command is not be matched with a command in database, the program returns to standby mode to fetch the next instruction in. If the voice command that is sent, matches a command which was saved in the database, the program performs the operation which is desired by executing the command . After the process was completed, if the Stop button was pressed , the program is terminated. Unless Program Stop button was pressed, the program returns to standby mode to fetch the next voice command. The interface of the program which is developed is shown in figure 2.

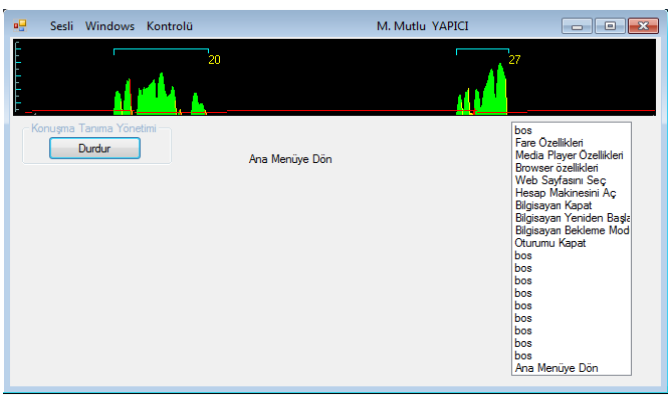


Figure 2. Voice-controlled Windows program interface

After the program was activated by pressing the start button, the web browser, media player, calculator and windows desktop features are controlled with the commands which are in the list of command. As an example,

in the main menu, If we give the command of "media player features" to control media player through the microphone, command list which has media player commands would be listed as is shown in figure 3.

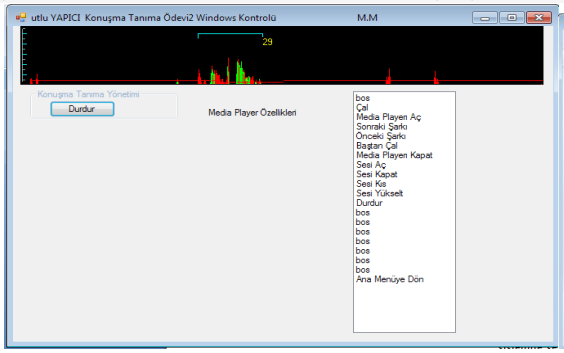


Figure 3. Voice controlled Media player command list

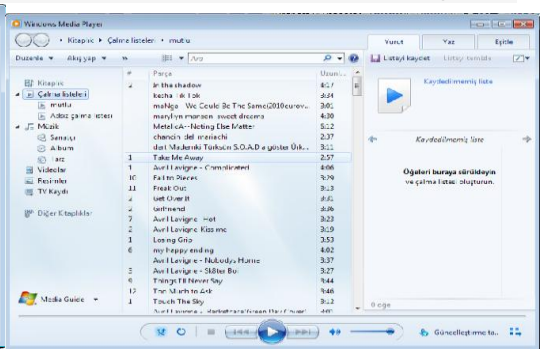

Figure 4. Voice controlled media player

Media player can be controlled by the desired command that in the Media player features list. When "Media Player Open" command is given, the media player will open 'as shown in figure 4. When "play" command is given to the Offered media player through a microphone, track in the playlist will start playing. Switching between songs on the media player list can be achieved by "previous song" and "Next song" commands can being given. To increase the volume, "Increase the volume" command is given, and with the same way, to decrease the volume, "decrease the volume" command is given. To turning back to the main menu and control the other programs, "Back to main menu" command is given. As an example, after turning to the main menu, "Browser features" command is given to see the web browser commands list. To open firefox web browser, "Open Firefox" command in the list is given through microphone. Web browser can be controlled by commands that in the "web browser features menu". The command list is shown in figure 5.

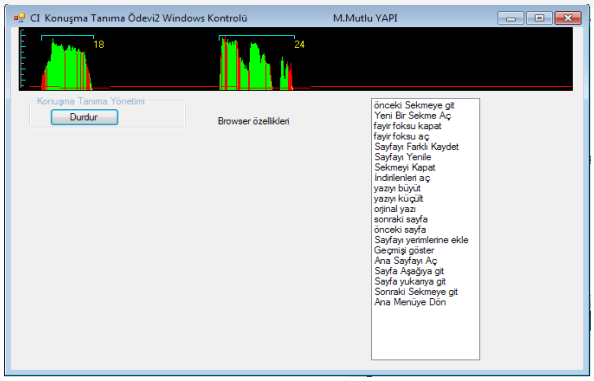


Figure 5. Voice controlled web browser features command list

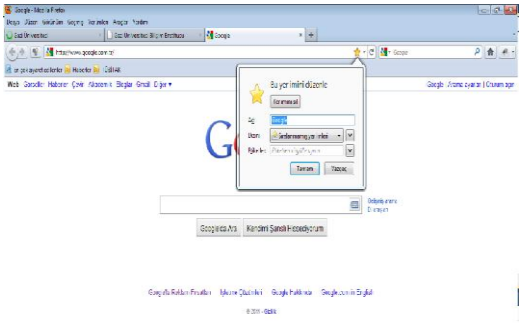

Figure 6. Voice controlled web browser

Using the web browser features menu, we can open a new tab, can switch between tabs, can save the web page, can add the page bookmarking , can control the page features , such as moving up and down. The web browser screen that is opened using voice command given in figure 6 . While in the web browser features menu, after the opening a new tab with "Open a new tab" command, we can return back to the main menu with "main menu " command. Then we can see the web sites list with using "Select a Web page" command. The web sites list is shown in figure 7. We can open desired web site in the list by using the voice command.

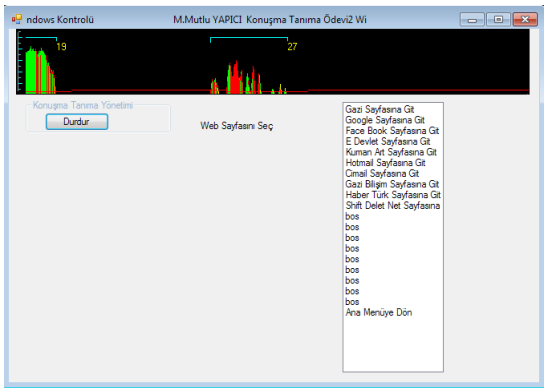


Figure 7. Select a Web Page Menu which is opened with using a voice command

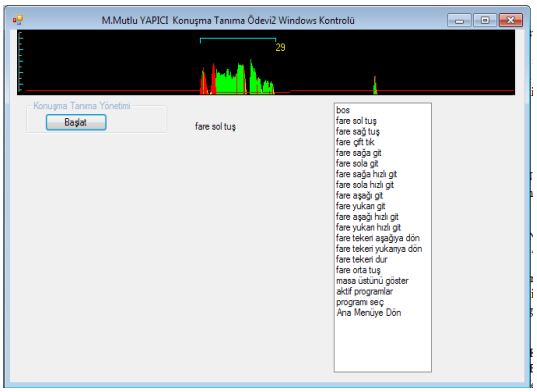


Figure 8. Voice controlled mouse properties menu

All the features in windows operating system which can be controlled by mouse, can be controlled via sent "Mouse Properties" voice command in the main menu through the developed program. For example, after the passing to mouse properties menu from the main menu, mouse can be moved to the position of the desired link via sent "go right", "go left", "go down", "go up" voice commands. Then the link can be opened via sent the "double click" or "mouse left click" voice command. If desired, you can go to desktop via using "go to the desktop" voice command on mouse properties menu. After you have brought the mouse on a file or program on the desktop, you can open the file or execute the program by using the voice command. Mouse properties menu is shown in the figure 8. The calculator program in the operating system can be run via sending "Open Calculator" command on the main menu. Thus, the commands list that are required to control calculator will be shown on the screen. The numeric data can be entered via using "zero", "one", "two", "three", "four", "five", "six", "Seven", "eight", "nine" commands in the list. The "Plus", "minus", "multiply", "divide" and "equals" commands can be used to make numerical computing with the data. In addition to these commands, if you wish to get power of the number from the desired degree, you can enter exponent degree of the number , after the number was entered. As an example, To calculate power of the number two from degree of the five, "two", "power" and "five" commands must be respectively sent on calculator properties menu, after the calculator program was executed. To see the result after each transaction "equals" command must be sent. If you wish, you can calculate square root of number by sending "square root" command via microphone. As you can see the basic functions of the calculator can be used with voice commands without touching the keyboard through the program. This feature is very handy, especially for visual impaired and physical impaired people. The calculator menu is shown in Figure 9.

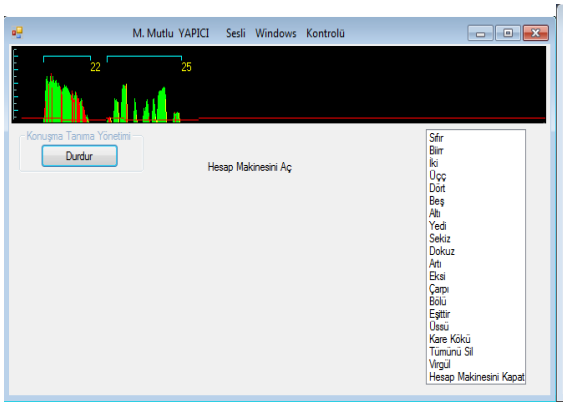


Figure 9. Calculator Menu

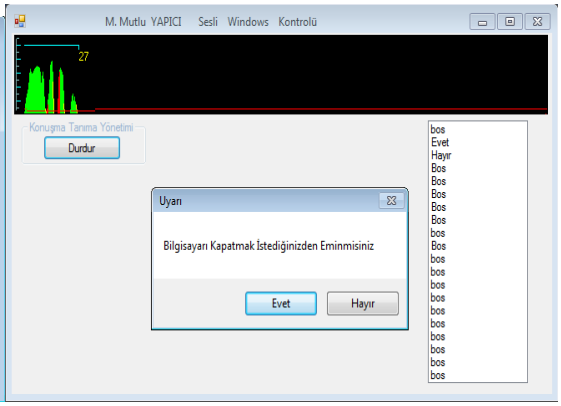


Figure 10. The confirmation menu which is displayed after the Shut Down" voice command was sent

With the developed program, other properties as shut down the computer, restart the computer, sleep mode, turn off the current user session can be also controlled by voice command. These processes can be used on the program's main menu. For example, "Turn Off Computer" shuts down the computer with voice command

, "Restart Computer" restart the computer with the voice command, "Standby Mode" command to get the computer to sleep mode or "Log Off" command turned off the current user's session. As shown in Figure 10, when using these features, the confirmation message box is displayed on the screen each time to confirm transactions. This confirmation box can be confirmed through sending the "yes" voice command, or can be canceled through sending the "no" voice command. This voice command verification features have been added in order to prevent to accidental shut down the computer.The developed program is working as independent from a person. Differences in the program from other developed programs which is designed to control the media player, the web browser and the windows operating system's properties through voice command, is that it offers the ability to control the all these programs. In addition, a custom-defined short cuts function of the keyboard and all the properties of mouse is able to controlled by voice commands.

## 3. Conclusion

In this study, the program was developed to control to some windows operating system's programs through sending voice command by microphone. Developed program is user-independent. The program was developed with c sharp programming language which installed voice command recognition's API. Web browser, media player, calculator, mouse actions, folders actions and desktop properties in windows operating system can be controlled through sending voice commands by microphone with the program. Thus, more comprehensively and more easily computer controlling is aimed by visual impaired and physical impaired people. Through this study, computer users, especially impaired users can open the web browser, make surf between pages, control the web browser more easily and more effectively by voice commands. By this study, computer users, especially impaired users can open the web browser, make surf between pages, control the web browser more easily and more effectively by voice commands, after activated the program (if you wish, the program can be activated automatically when operating system is started). In the same way with voice commands, media player can be started, can choose a song to play, can pass between the songs, can set the volume. Moreover, all the mouse properties can be controlled by developed program with the voice commands. In addition, calculator can be controlled, folders can be opened and executable programs can be execute, computer can be shut down, restarted or set standby mode, and passing between the programs which are in task bar can be performed by voice commands. The aim that requested by succeeding is control the computer through sending voice commands by people from their seats. The developed program which is designed to control many windows operating system's programs with voice command can be improved to control all window's programs and properties. Thus, all the operating system can be controlled by voice commands.

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