An application to control media player with voice commands

Ses komutları ile media player kontrolü için bir uygulama

Yazar(lar) (Author(s)): Emre AVUÇLU¹, Ayhan ÖZÇIFÇİ², Abdullah ELEN³

ORCID¹: 0000-0002-1622-9059
ORCID²: 0000-0001-7733-9959
ORCID³: 0000-0003-1644-0476

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**Highlights**

- In the developed application, operations with keyboard and mouse can be done with voice commands.
- Voice commands can be sent with the wireless headset from anywhere in the shooting area.

**Graphical Abstract**

The following Figure shows a general voice recognition process.

![Voice recognition process diagram](image)

**Aim**

This application was developed to address the needs of people who cannot listen to music on their own due to any disability.

**Design & Methodology**

In order to manage the media player with voice commands, voice recognition libraries were first used.

**Originality**

In this study, an application that provides media player control with voice commands was developed.

**Findings**

In this study, test procedures were performed with 20 people. In some word tests, more than one test was performed over the same person's voice.

**Conclusion**

100% accurate recognition can be achieved by using short words and words with full pronunciation when making voice definitions.

**Declaration of Ethical Standards**

The author(s) of this article declare that the materials and methods used in this study do not require ethical committee permission and/or legal-special permission.
Ses Komutları ile Media Player Kontrolü İçin Bir Uygulama

Araştırma Makalesi / Research Article

Emre AVUÇLU*, Ayhan ÖZÇİFÇİ2, Abdullah ELEN3
1Teknik Bilimler Meslek Yükse Okulu, Bilgisayar Tek. Bölümü, Aksaray Üniversitesi, Türkiye
2Mühendislik Fakültesi, Endüstri Müh. Bölümü, Aksaray Üniversitesi, Türkiye
3 TOBB Meslek Yükse Okulu, Bilgisayar Tek. Bölümü, Karabük Üniversitesi, Türkiye
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ÖZ
Günümüzde teknolojiyi kullanmak insanların hayatlarını kolaylaştırmak açısından büyük öneme sahiptir. Teknolojile bazı uygulamaları çalıştırmak çok kolay bir hal almıştır. Bu çalışmada ses komutları ile media player kontrolü sağlayan bir uygulama geliştirilmiştir. Herhangi bir engelinden dolayı kendi kendine müzik dinleyemeyen kişilerin ihtiyaçlarını gidermek için bu uygulama geliştirilmiştir. Uygulama C# programlama dilinde geliştirilmiştir. Media player’ı ses komutları ile yönetebilmek için önce ses tanıma kütüphanelerinden faydalanılmıştır. Geliştirilen uygulama da klavye Mouse ile media player üzerinden yapılan işlemler ses komutları ile gerçekleştirilmiştir. Ses komutları kablosuz kulaklık ile çekim alanı olduğu bir yerden verilebilir.

Anahtar Kelimeler: Ses tanıma, media player kontrolü, engelli birey.

An Application to Control Media Player with Voice Commands

ABSTRACT
Using technology today is of great importance in terms of making people’s lives easier. It has become very easy to run some applications with technology. In this study, an application that provides media player control with voice commands was developed. This application was developed to address the needs of people who cannot listen to music on their own due to any disability. The application was implemented in C# programming language. In order to manage the media player with voice commands, voice recognition libraries were first used. In the developed application, operations with keyboard and mouse can be done with voice commands. Voice commands can be sent with the wireless headset from anywhere in the shooting area.

Keywords: Voice recognition, media player control, disabled individual.

1. INTRODUCTION
Today, it is nearly not possible for people to live and carry out some operations without technology. People have developed and used technology every day for their own benefit. Today it is very easy to control any application with software. Nowadays, many applications can be controlled with software so that people can live more comfortably. People can see examples of such practices in every aspect of their lives.

To facilitate the social life of people in studies in this field in the literature: Different voice recognition algorithms and command sets were used on MATLAB [1]. With different voice recognition algorithms, “On TV”, “Off TV”, “Volume Up”, “Volume Down” and “Channel One” command sets were tried separately for male and female users [2]. It has been tried by establishing different algorithms on a phone simulation. The results obtained were found to vary according to the way the voice is spoken [3]. Over 80% success was achieved in voice recognition on the letters “a”, “e” and “i” [4]. In a different study, separate tests were performed on male and female users with different algorithms [5].

Using artificial intelligence techniques, a voice recognition system independent of text and speaker was developed on the Turkish language [6]. The syllable-based Turkish word recognition system was developed using different voice recognition algorithms [7, 8]. In the simulation environment performed on MATLAB, the successful recognition rate for 10 people was found to be 99% [9]. They performed music and speech recognition [10]. Successful results were obtained in the study which performed 40 commands [11]. It was controlled by voice commands of a remote controlled car [12]. It has been tried to determine the English pronunciation of the numbers 0-9 [13].

In this study; an application was developed to control the media player to listen to music over the computer. The application was implemented using the SpeechRecognitionEngine Class in the System.Speech library in the C#.Net Framework. If there is a match in voice commands, the operations that can be done with mouse and keyboard are executed.

*Sorumlu Yazar (Corresponding Author)
e-posta : emreavuclu@aksaray.edu.tr
2. MATERIAL and METHOD
The application was programmed in C# programming language. This section describes how the voice recognition process is performed.

2.1. Voice Recognition Process
First stage; the voice recorded in the system. Once the voice is recorded, it can go through various processes and be processed. The following Figure 1 shows a general voice recognition process.

![Figure 1. Voice recognition process.](image)

The voice is digitized to perform these operations. The voice is first filtered and then sampled for digitization. Figure 2 shows an example of digitization function.

![Figure 2. Example of digitization function.](image)

Where \(x(t)\) is the analog signal, \(x(nT)\) is the digitized signal. In the digitizing stage, the filter shown in Figure 2 refers to the analog filter analog filtering and sampling are performed during the recording of the voice.

In order to use digital signal processing techniques, the analog signal must be represented as a series of numbers [14]. It utilizes the analysis and separation of voice signals to detect voice after sampling.

The voice wave that forms the sound has two important features. These properties are amplitude and frequency [15]. Frequency, while determining the soundness and quiver characteristics of voice; amplitude determines the intensity of the voice and the energy it carries. Equation 1 is given for the Total Amplitude (TG) calculation.

\[
TG = \sum_{t=1}^{n} x(t)
\]  

In this equation \(x(t)\) amplitude at time \(t\); In other words, it expresses the energy carried by the voice wave at the moment \(t\). If the sum of the total amplitude value calculated by this method is above a certain value, then the meaning of sound, that is, speech, is started.

Filters are used for two purposes in the processing of voice. These are the separation of the voice signal and the correction of the voice signal. Digital filters are FIR (Finite Impulse Response) filter and IIR (Infinite Impulse Response) filter. In FIR filters, the input signal forms the output \(y_n\), which is the weighted sum of the current and previous inputs versus \(x_n\). The mathematical expression of this filter is given by Equation 2.

\[
y_n = b_0 x_n + b_1 x_{n-1} + b_2 x_{n-2} + \cdots + b_q x_{n-q}
\]  

In this equation \(y_n\) is the result of the filter output. In IIR filters, the input signal constitutes the output \(y_n\), which represents the weighted sum of the previous outputs, together with the weighted sums of the current and previous inputs versus \(x_n\). In this model, together with the \(x_n\) input, the weighted sum of the previous \(p\) outputs gives the filter output \(y_n\). After digitizing the voice, the voice is encoded and the voice recognition process is completed. The following libraries should first be added to the system for voice recognition.

```c#
using System.Diagnostics;
private SpeechLib.SpSharedRecoContext objRecoContext = null;
private SpeechLib.ISpeechRecoGrammar grammar = null;
private SpeechLib.ISpeechGrammarRule menuRule = null;
```

The design of the application consists of certain stages. From the recognition of voice commands to the execution of the media player, a number of operations are carried out. The flow diagram of the developed application is as in figure 3.
Firstly, we need to add the media player component to our application as shown in Figure 4.

![Figure 4. Interface of the developed application.](image)

The general form design view of the application to be managed by voice commands is shown in Figure 5. We can activate or deactivate this application at any time.

![Figure 3. General structure of the system.](image)

![Figure 2. Flow diagram of the system.](image)

We need to include the following library in our system first.

```
using System.Speech.Recognition;
```

Voice detection can be performed with the methods in the "System.Speech" library in the .Net Framework. The following code blocks are used in the system for feedback after voice recognition.

```
SpeechSynthesizer Speech = new SpeechSynthesizer();
PromptBuilder Builder = new PromptBuilder();
SpeechRecognitionEngine Recognition = new SpeechRecognitionEngine();
```

First, the “player” command is given to start the application. This starts the application.

```
if (avuclu.Text == "player")
{
    var mediaPlayer = "C:\Program Files\Windows Media Player\wmplayer.exe";
    System.Diagnostics.Process.Start(mediaPlayer);
}
```

The code block required to activate or deactivate the application is as follows.
The definitions and their use for controlling the media player with voice commands are shown in Table 1 below.

Table 1. Commands and functions.

| Voice command | Feature                  |
|---------------|--------------------------|
| Player        | Open the media player    |
| Open          | Add mp3 list to media player |
| Active        | Media player active      |
| Passive       | Media player passive     |
| Play          | Mp3 Play                 |
| Pause         | Mp3 Pause                |
| Next          | Mp3 Next in list         |
| Previous      | Mp3 previous in list     |
| Stop          | Mp3 Stop                 |

After verification of the required definitions and voice command, the data transmission process is executed with the following code block.

```csharp
avuclu.Text = Result.PhraseInfo.GetText(0, -1, true); // activate
objRecoContext = null; // deactivate

if (recog.Text == "play")
{
    axWindowsMediaPlayer1.Ctlcontrols.play();
    SpeechSynth.Speak("play");
}
if (avuclu.Text == "pause")
{
    axWindowsMediaPlayer1.Ctlcontrols.pause();
    SpeechSynth.Speak("pause");
}
if (avuclu.Text == " next")
{
    axWindowsMediaPlayer1.Ctlcontrols.next();
    SpeechSynth.Speak("next");
}
if (avuclu.Text == "previous")
{
    axWindowsMediaPlayer1.Ctlcontrols.previous();
    SpeechSynth.Speak("previous");
}
if (avuclu.Text == "stop")
{
    axWindowsMediaPlayer1.Ctlcontrols.stop();
    SpeechSynth.Speak("stop");
}
```

3. CONCLUSION

As the pronunciation of the voice command becomes more difficult and the number of letters in it increases, the level of accurate voice recognition decreases. 100% accurate recognition can be achieved by using short words and words with full pronunciation when making voice definitions. With misrecognition, the voice command performs the function linked to the nearest voice command. No action can be taken with inability to identify. In this study, test procedures were performed with 20 people. In some word tests, more than one test was performed over the same person’s voice. The following in Table 2 shows the results of the experimental studies.

Table 2. Experimental results.

| Words  | Number of trials | Accurate recognition | False recognition | Error rate |
|--------|------------------|----------------------|--------------------|------------|
| Player | 20               | 18                   | 2                  | %10        |
| Open   | 20               | 17                   | 2                  | %15        |
| Active | 15               | 14                   | 1                  | %6.66      |
| Passive| 15               | 13                   | 2                  | %13.33     |
| Play   | 10               | 10                   | 0                  | %0         |
| Pause  | 12               | 10                   | 1                  | %16.66     |
| Next   | 10               | 10                   | 0                  | %0         |
| Previous| 25              | 18                   | 5                  | %28        |
| Stop   | 25               | 23                   | 1                  | %8         |

As can be seen from the results, it was more difficult to identify words with a high number of words and difficult to pronounce. The application has a coding that can do everything we do about daily media player with voice commands. It is thought that the application will be useful for people who cannot use the computer for any reason (bedridden, elderly, disabled, etc.). Specially developed to facilitate the lives of the visually impaired. With the application you can meet your daily music listening needs without being connected to anyone.

In this study, media player control was provided to listen to music by remote voice commands. Voice commands can be sent from any point with a wireless or wired headset. Media player was managed with voice commands without using mouse and keyboard. In addition, this study will enable people with disabilities, elderly or bedridden patients to meet their listening needs. The application developed in C# using the Speech.dll library was tested with different voice commands.

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DECLARATION OF ETHICAL STANDARDS

The author(s) of this article declare that the materials and methods used in this study do not require ethical committee permission and/or legal-special permission.
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