Advanced Science and Technology Letters
Vol.30 (ICCA 2013), pp.183-186
http://dx.doi.org/10.14257/astl.2013.30.39

Windows Control System using Voice and Motion Recognition of Kinect Sensor

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Abstract. Recently, many new concepts have been developed for human-computer interaction interface. XBOX, was introduced my Microsoft, is a game device with console interface. Kinect is a low-cost device which supports multiple speakers, microphone, RGB camera, depth camera for voice recognition, motion recognition. At the beginning Kinect was developed for XBOX, then it was supported various functions for Window system. In this paper, we propose a window system interface based using Kinect voice and motion recognition. Instead of using mouse or keyboard, users can easily control the computer by their voice and motion, especially hand gestures. In additional, we develop a voice recognition system for Kinect. With the voice recognition system, Kinect not only can recognize words or command, but also sentences. Also, we construct a registration system to add new voice/sentences from users.

Keywords: Kinect, Windows control, motion interface, voice recognition.

1 Introduction

Nowadays, there are many human-computer interaction interfaces was developed based on the human's behavior such as finger/arm movements, tongue movements, etc. Microsoft also tries to attempt a new human-computer interaction interface for Window system so the Kinect was developed. Kinect [1] has a depth sensor, video sensor, and multi-array microphone. Kinect uses these sensors for tracking and recognition voice, gesture, and motion.

In paper [2, 3], authors gave introductions of using depth information from the depth sensor to create skeleton images, to track the coordinate of both user' hand. Then, user can use their hand to control the mouse. Also, authors presented the machine learning algorithm enables Kinect to recognize human-poses, and designed a gesture-recognition engine. Our previous research [4] introduced voice recognition as an interface for controlling the computer. However, it does not support hand recognition, motion recognition, or some kind of abilities such as touch, tap, double-tap, drag and so on. In [4], only voice recognition has been used. In source code, developer use If-Then structure to control computer by sending a defined voice command.

ISSN: 2287-1233 ASTL

In this study, we use voice recognition as well as motion recognition. We provide an interface for controlling the Windows system without using keyboard or mouse. We also provide a user word registration system which can be able to improve the range of use beyond the limits of words of the voice recognition, or to be added in according to the user's selection.

2 Windows Control System using Kinect Sensor

It is difficult to control the computing using only voice recognition. For example, select a file, browse the internet, or switch between two application, etc. So, we propose an interface includes both voice and motion recognitions. The interface supports users to use their left or right hand to control the mouse pointer, use voice to select (double click action). For instance, user use hand moves the mouse pointer to a file he wants to open, and then say “Choice”.

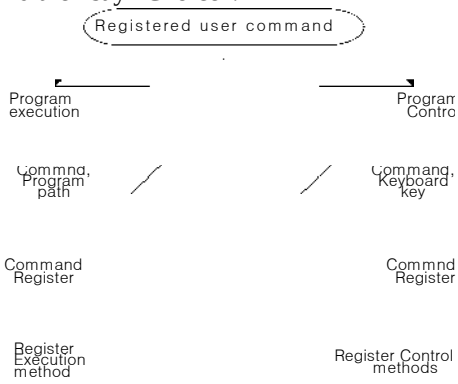

Fig. 1. Registered user commands.

According to voice recognition of paper [4], the program executes by handling simple input separately. Word-by-word is recognized and commands are pre-defined. Only developer can add new commands. User must learn the instructions and commands. The computer will be only controlled by registered commands. In this paper, we provide the user-defined voice command. It means that the users can add new commands to the system without limitation of the words. Figure 1 shows the registered user commands interface. This interface includes two kind of command register mode. First mode register commands for program execution. Second mode register commands for program control.

3 Implementation

Figure 2 is the implementation of the control program window. The screen of the program consists of the following features:

1. Display recognized Command

2. Display input command
3. Display Mode (Input mode, Command mode)
4. Delete registered control commands button
5. Add new control command button
6. Display input control command
7. Display input execute command
8. Execute command, and search program' path
9. Add new execute command button
10. Delete execute command button

Fig.2. Execution screen.

Figure 3 shows the screen of our program and the run program which is executed by voice command register. In previous voice command interface [4], developer must define all commands and corresponded execute program by providing command voice and execute program' path in the source code. However, this command register interface provide user to add new command to execute the program he wants.

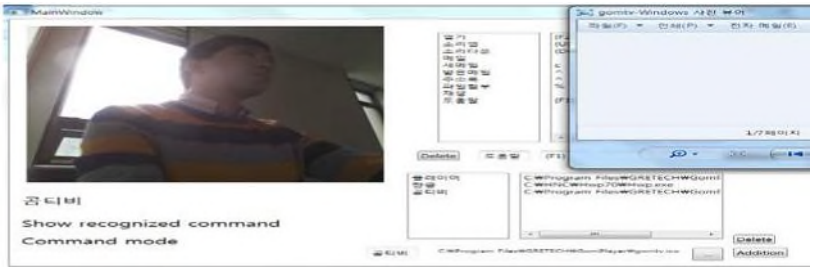

Fig.3. Execution command register screen.

Figure 4 shows the screen of Hangul program is being run. Now, our command register interface help to register new command by voice recognition. Almost common voice recognition programs, corresponds commands of hotkeys are manipulated in the source code, and by the developer. However, our command register interface supports user to insert more command for a hotkey. By using this interface user can extend the operations of executed program.

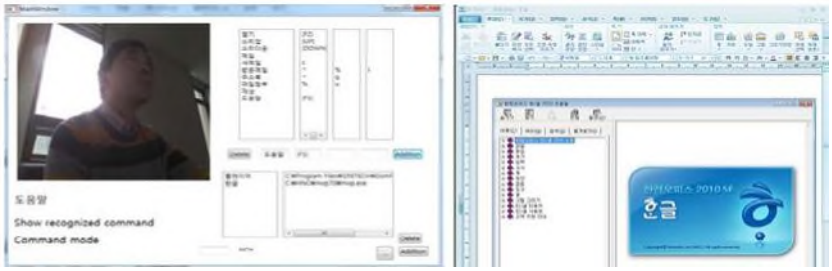

Fig.4. Control command register screen.

4 Conclusion

This study is based on Microsoft Kinect sensor with motion and voice recognition for developing an interface to control Windows System. Combination between motion and voice not only replace the mouse function but also provide an interface to user to add more operations/commands by using registration method so that users can control their computer depend on their own need.

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