US 20130073293A1

(19) United States

(12) Patent Application Publication

JANG et al.

(10) Pub. No.: US 2013/0073293 A1

(43) Pub. Date: Mar. 21, 2013

(54) **ELECTRONIC DEVICE AND METHOD FOR CONTROLLING THE SAME**

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(21) Appl. No.: **13/236,732**

(22) Filed: **Sep. 20, 2011**

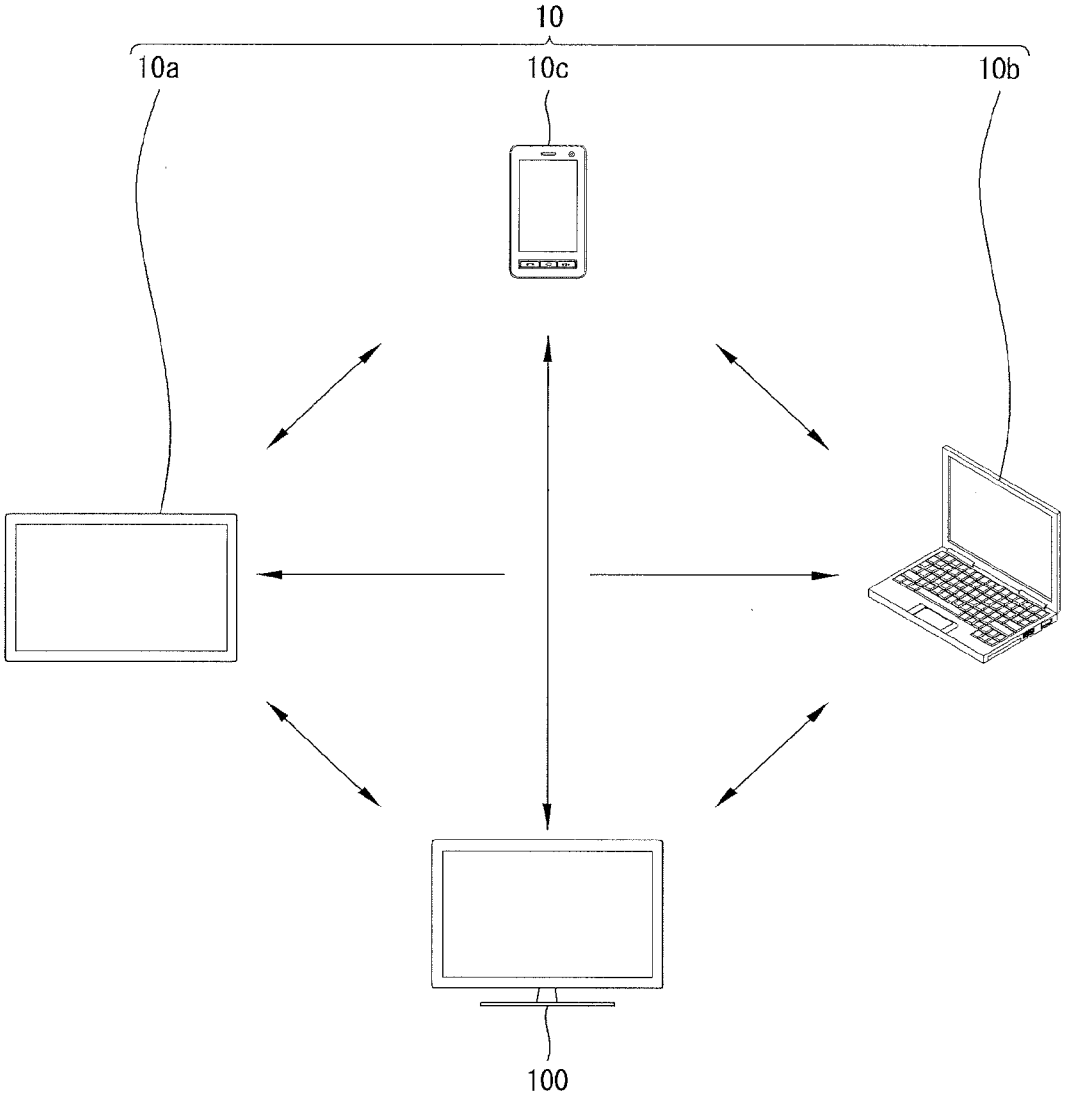
Publication Classification

(51) **Int. Cl.**
G10L 21/00 (2006.01)

(52) **U.S. Cl.**
USPC **704/275**; 704/E21.001

(57) **ABSTRACT**

An electronic device, a system including the same, and a method for controlling the same are provided. The electronic device may select a specific electronic device to perform a user's voice command in an environment including a plurality of electronic devices capable of voice recognition. The embodiments of the present disclosure allows for interaction between the user and the plurality of electronic devices so that the electronic devices can be efficiently controlled in the N screen environment.



SONOS EXHIBIT 1004

Fig 1.

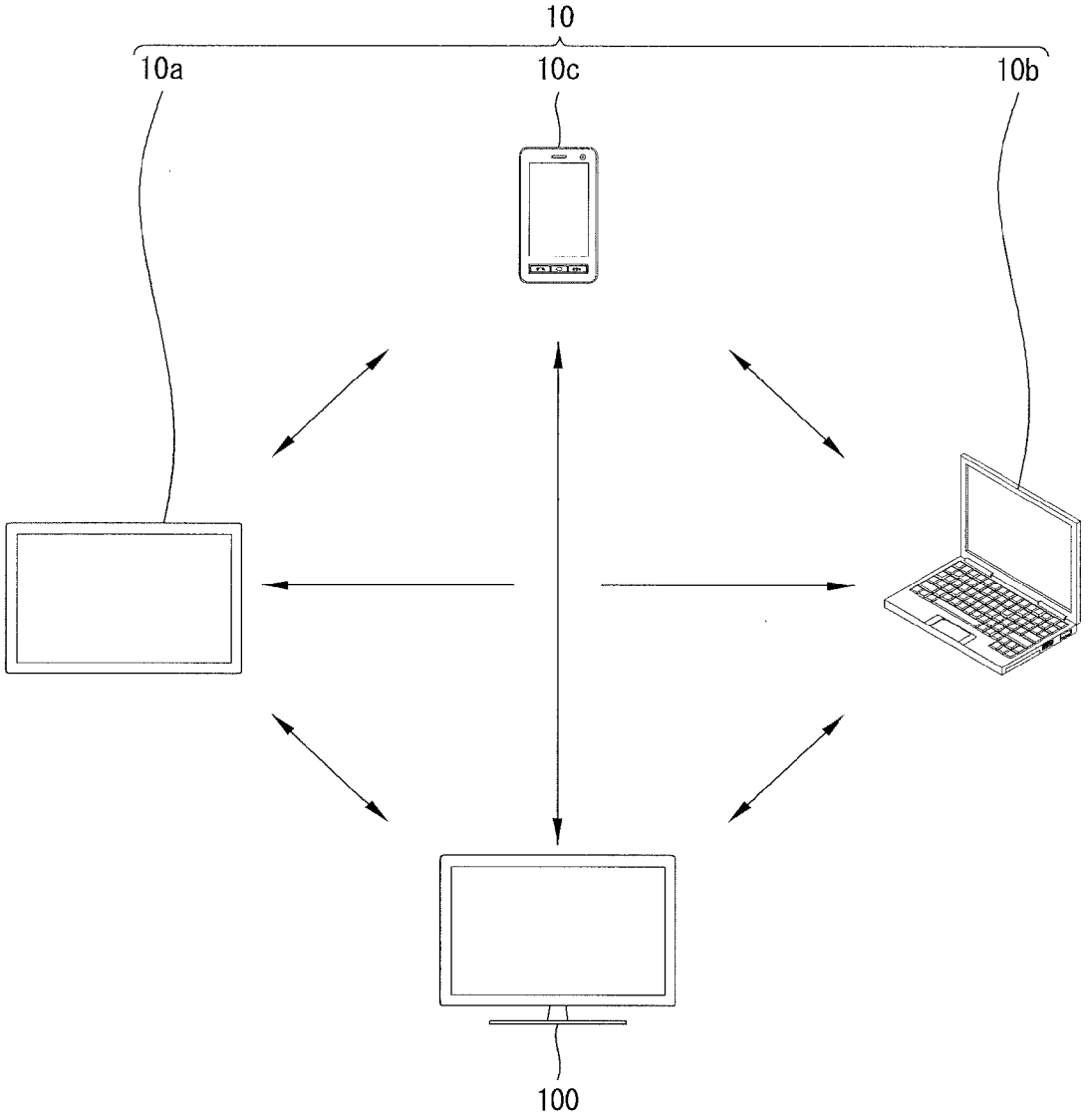


Fig 2.

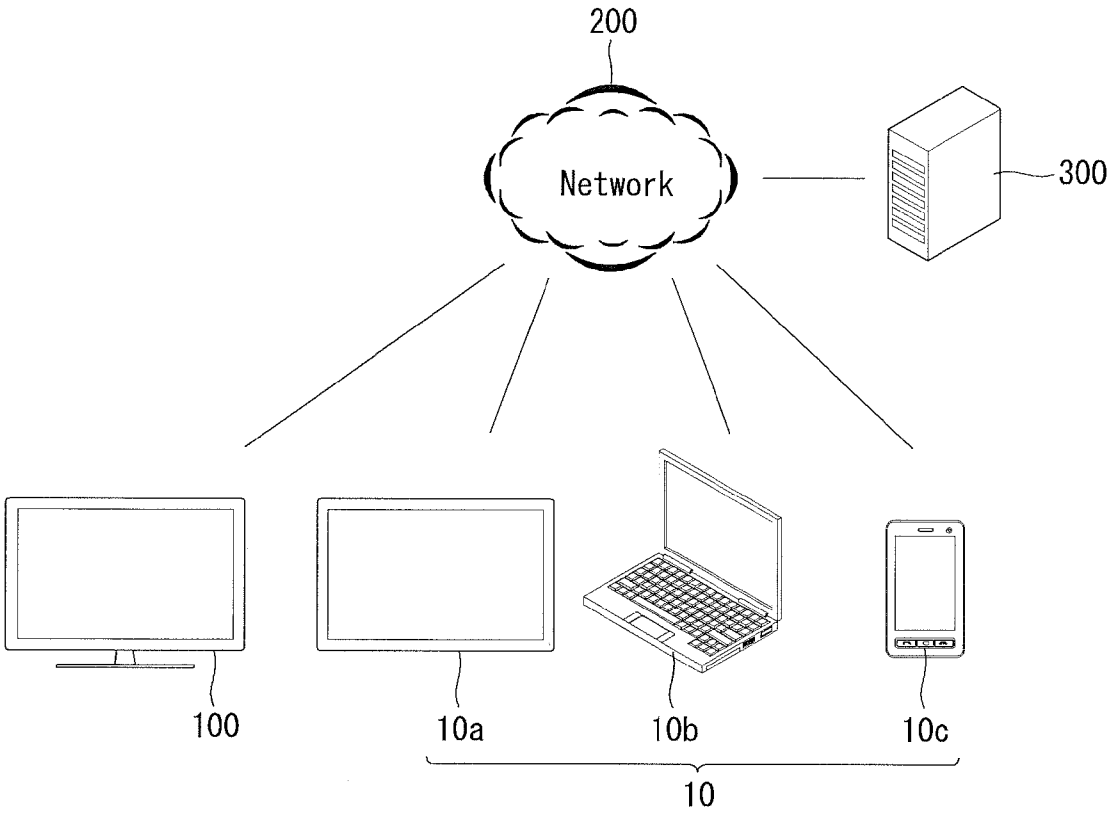


Fig 3.

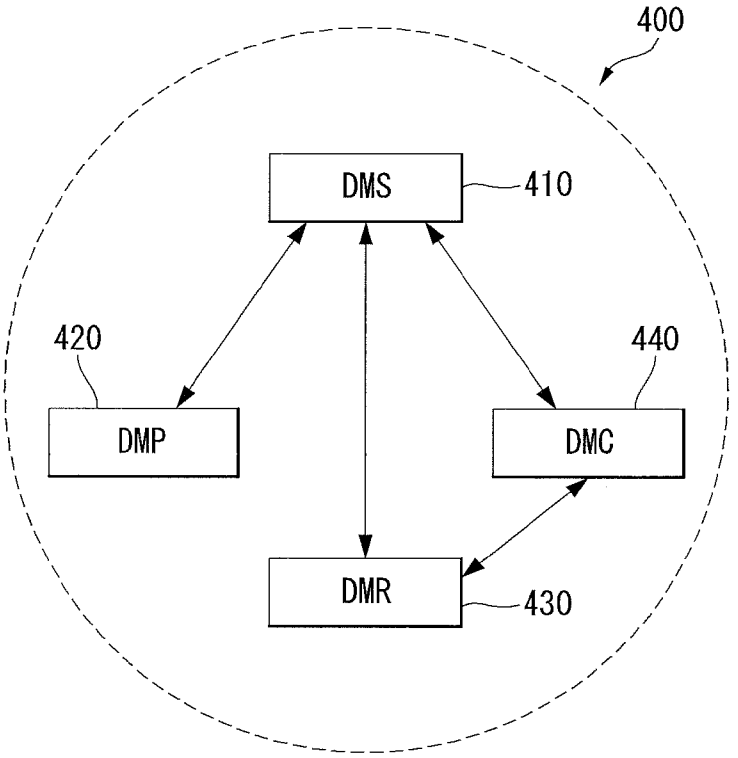

400
DMS
410
420
440
DMP
DMC
DMR
430

Fig 4.

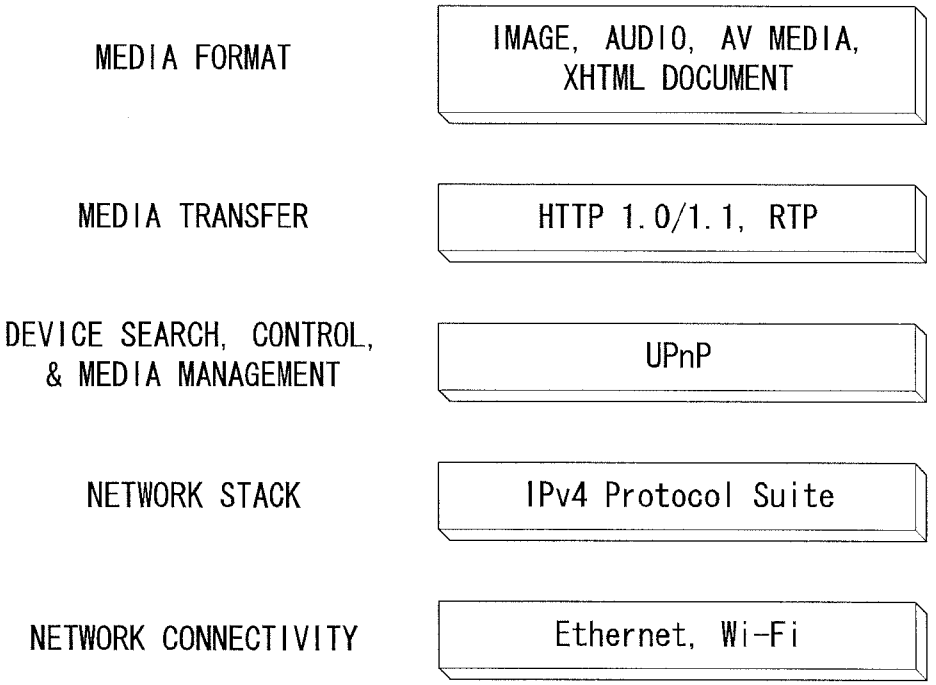

MEDIA FORMAT
IMAGE, AUDIO, AV MEDIA, XHTML DOCUMENT
MEDIA TRANSFER
HTTP 1.0/1.1, RTP
DEVICE SEARCH, CONTROL, & MEDIA MANAGEMENT
UPnP
NETWORK STACK
IPv4 Protocol Suite
NETWORK CONNECTIVITY
Ethernet, Wi-Fi

Fig 5.

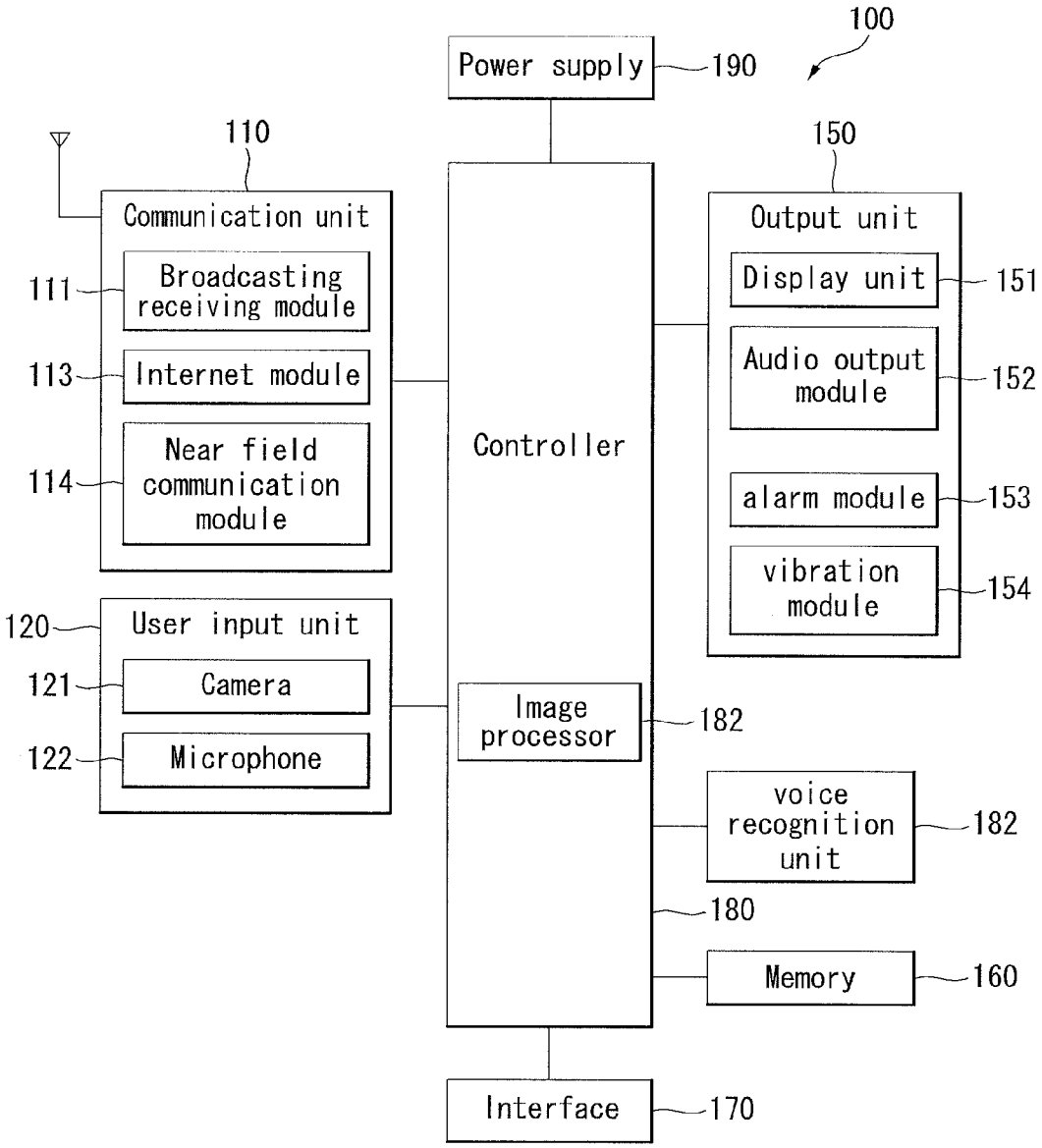

100
Power supply
190
110
Communication unit
111
Broadcasting receiving module
113
Internet module
114
Near field communication module
120
User input unit
121
Camera
122
Microphone
Controller
Image processor
182
150
Output unit
Display unit
151
Audio output module
152
alarm module
153
vibration module
154
voice recognition unit
182
180
Memory
160
Interface
170

Fig 6.

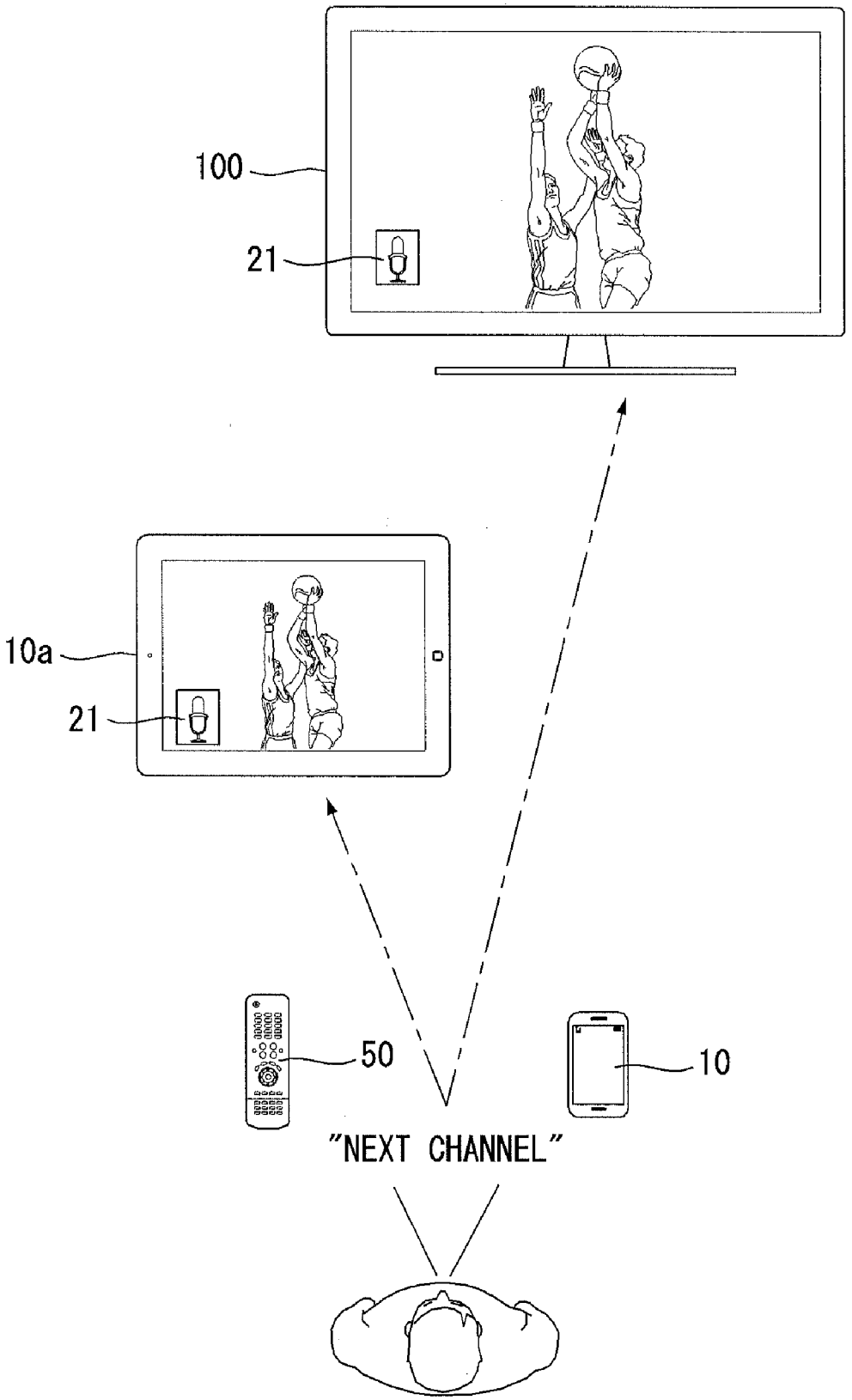


Fig 7.

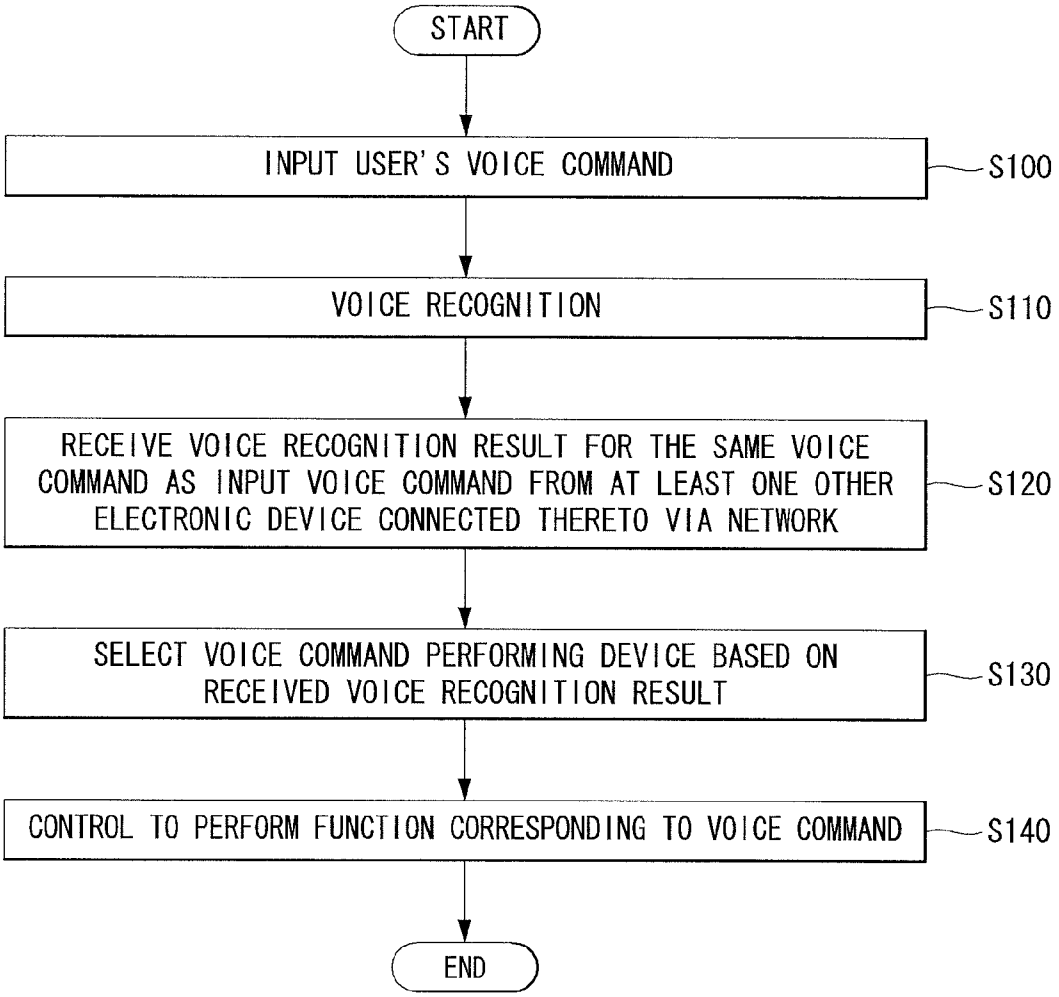

START
INPUT USER'S VOICE COMMAND
S100
VOICE RECOGNITION
S110
RECEIVE VOICE RECOGNITION RESULT FOR THE SAME VOICE COMMAND AS INPUT VOICE COMMAND FROM AT LEAST ONE OTHER ELECTRONIC DEVICE CONNECTED THERETO VIA NETWORK
S120
SELECT VOICE COMMAND PERFORMING DEVICE BASED ON RECEIVED VOICE RECOGNITION RESULT
S130
CONTROL TO PERFORM FUNCTION CORRESPONDING TO VOICE COMMAND
S140
END

Fig 8.

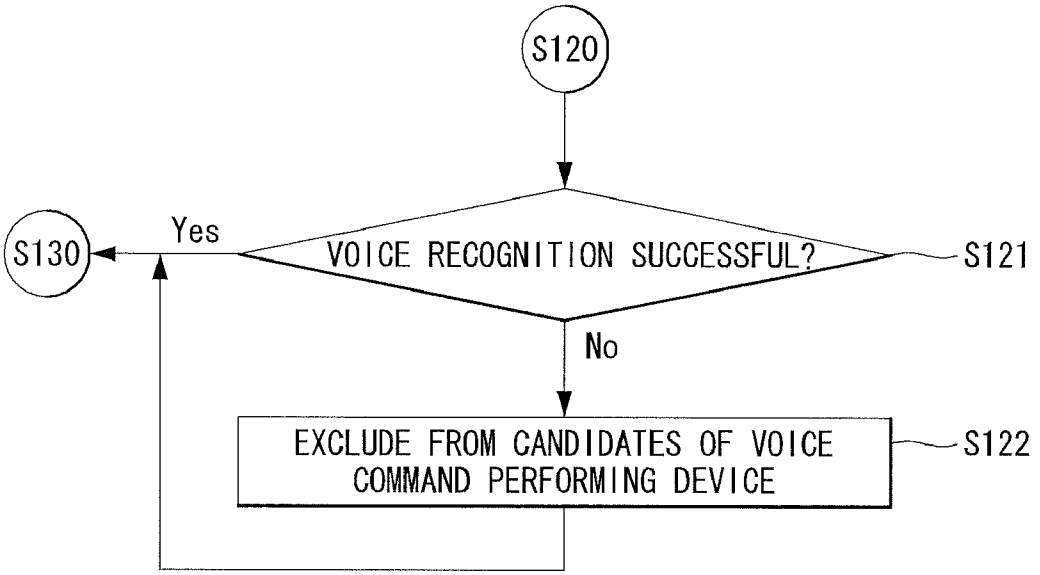

S120
VOICE RECOGNITION SUCCESSFUL?
S121
Yes
S130
No
EXCLUDE FROM CANDIDATES OF VOICE COMMAND PERFORMING DEVICE
S122

Fig 9.

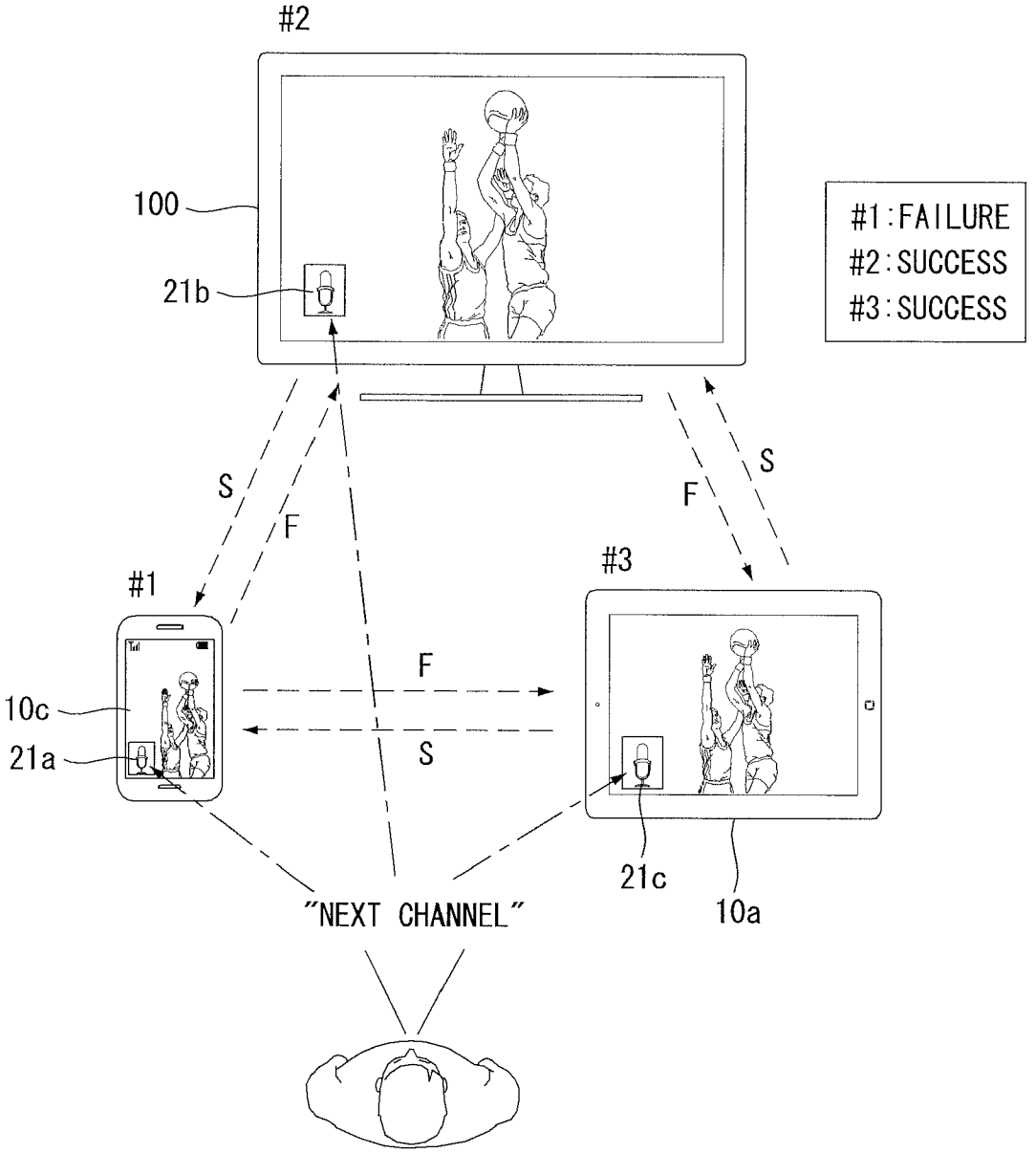

#2
100
21b
#1:FAILURE
#2:SUCCESS
#3:SUCCESS
S
F
F
S
#1
#3
F
S
10c
21a
21c
10a
"NEXT CHANNEL"

Fig 10.

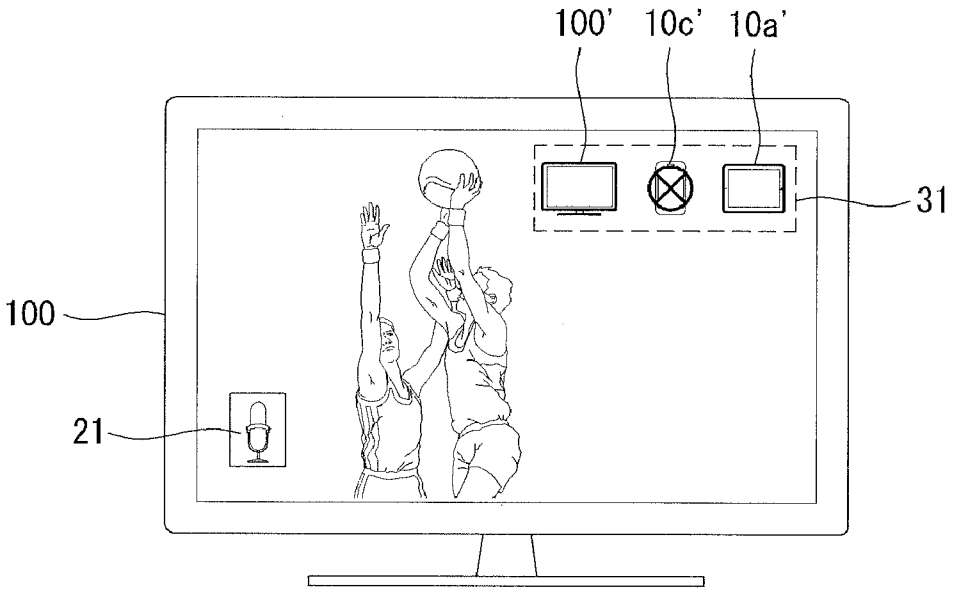

100'
10c'
10a'
31
100
21

Fig 11.

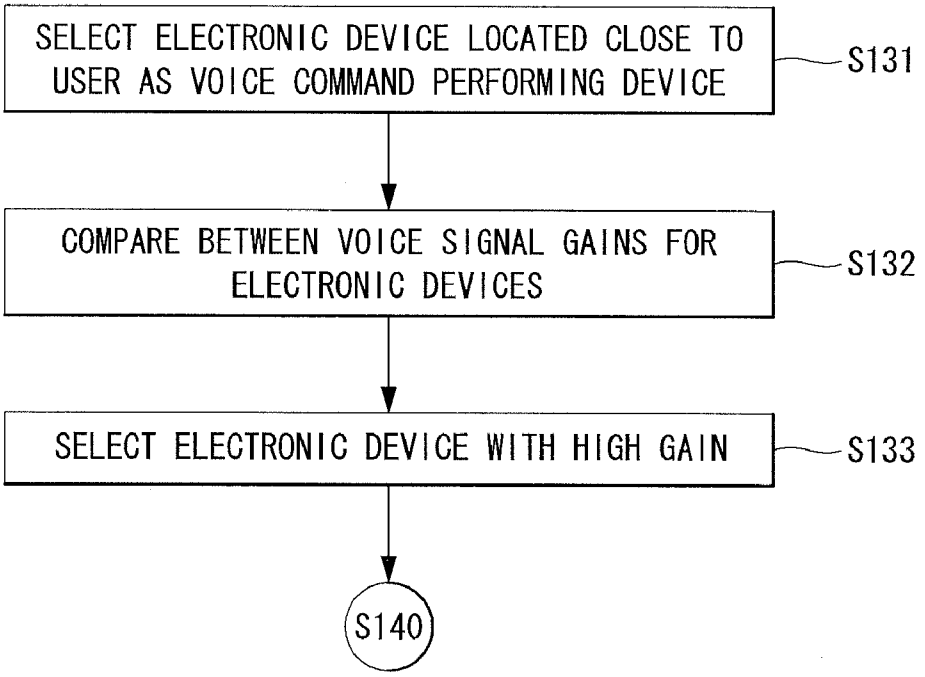

SELECT ELECTRONIC DEVICE LOCATED CLOSE TO USER AS VOICE COMMAND PERFORMING DEVICE
S131
COMPARE BETWEEN VOICE SIGNAL GAINS FOR ELECTRONIC DEVICES
S132
SELECT ELECTRONIC DEVICE WITH HIGH GAIN
S133
S140

Fig 12.

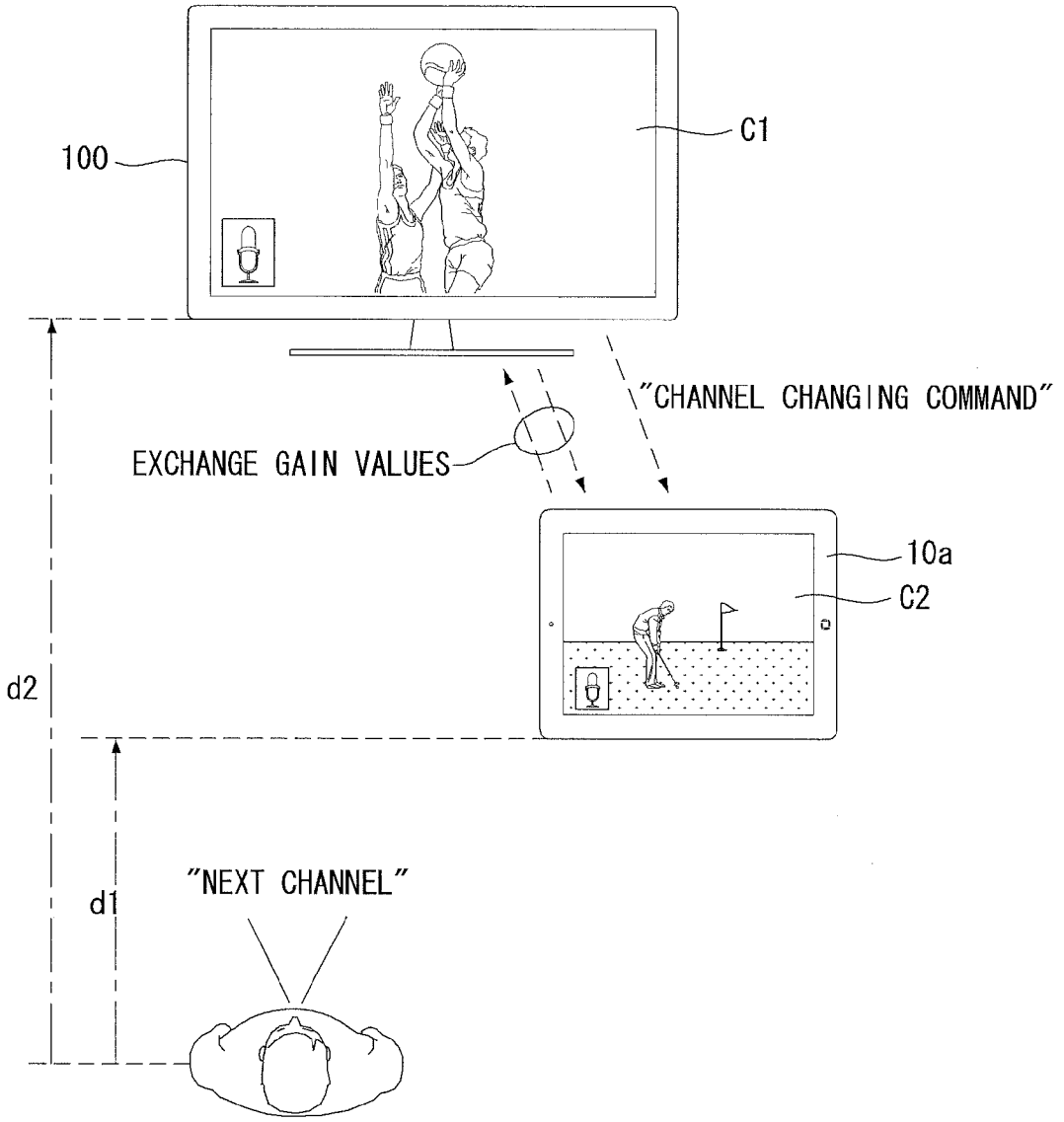

100
C1
"CHANNEL CHANGING COMMAND"
EXCHANGE GAIN VALUES
10a
C2
d2
d1
"NEXT CHANNEL"

Fig 13.

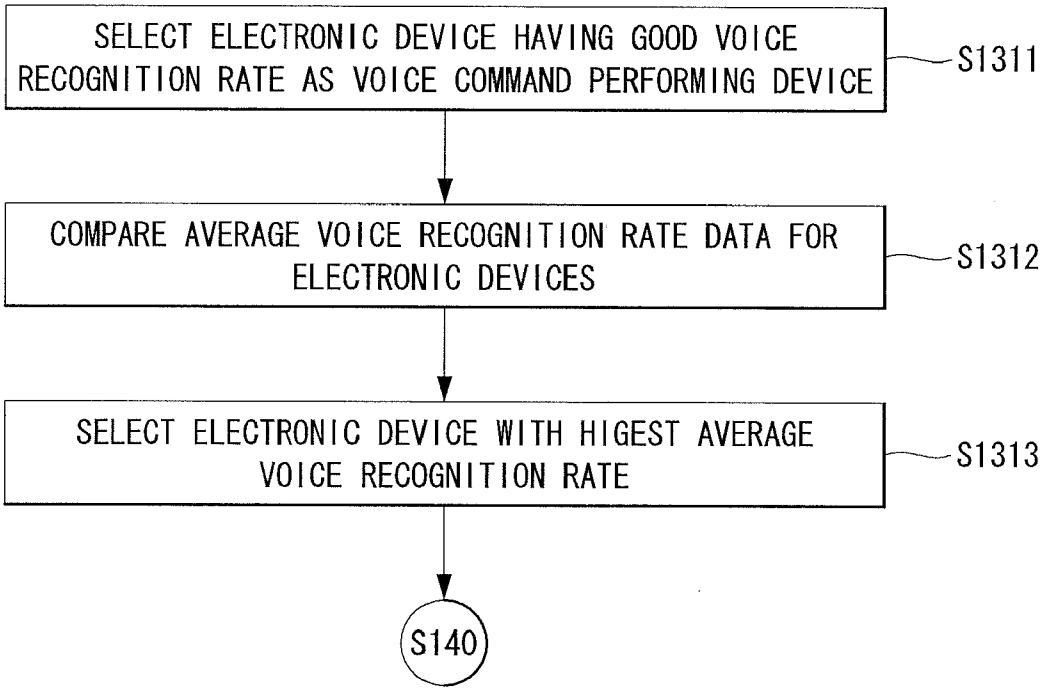

SELECT ELECTRONIC DEVICE HAVING GOOD VOICE RECOGNITION RATE AS VOICE COMMAND PERFORMING DEVICE
S1311
COMPARE AVERAGE VOICE RECOGNITION RATE DATA FOR ELECTRONIC DEVICES
S1312
SELECT ELECTRONIC DEVICE WITH HIGEST AVERAGE VOICE RECOGNITION RATE
S1313
S140

Fig 14.

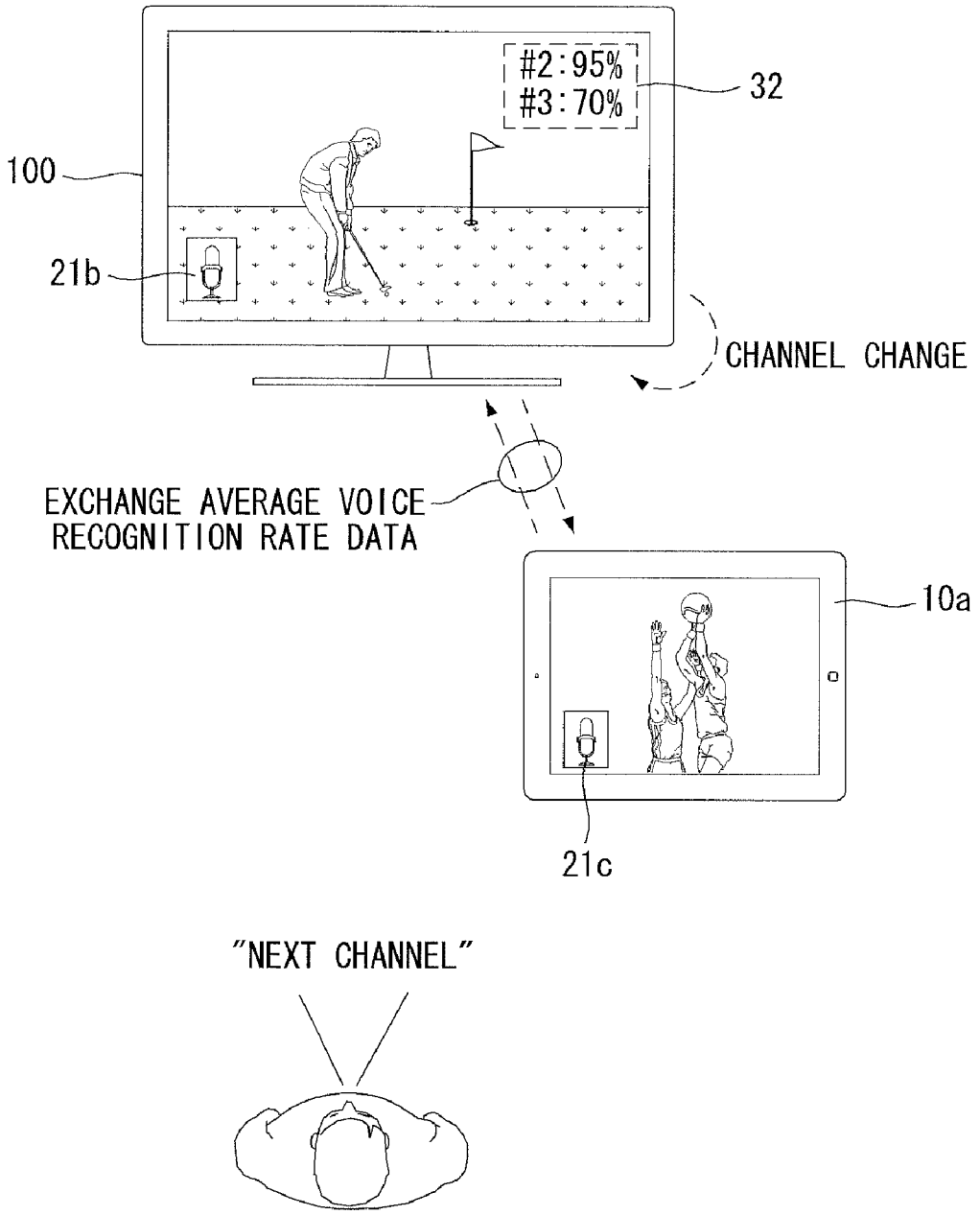

#2:95%
#3:70%
32
100
21b
CHANNEL CHANGE
EXCHANGE AVERAGE VOICE RECOGNITION RATE DATA
10a
21c
"NEXT CHANNEL"

Fig 15.

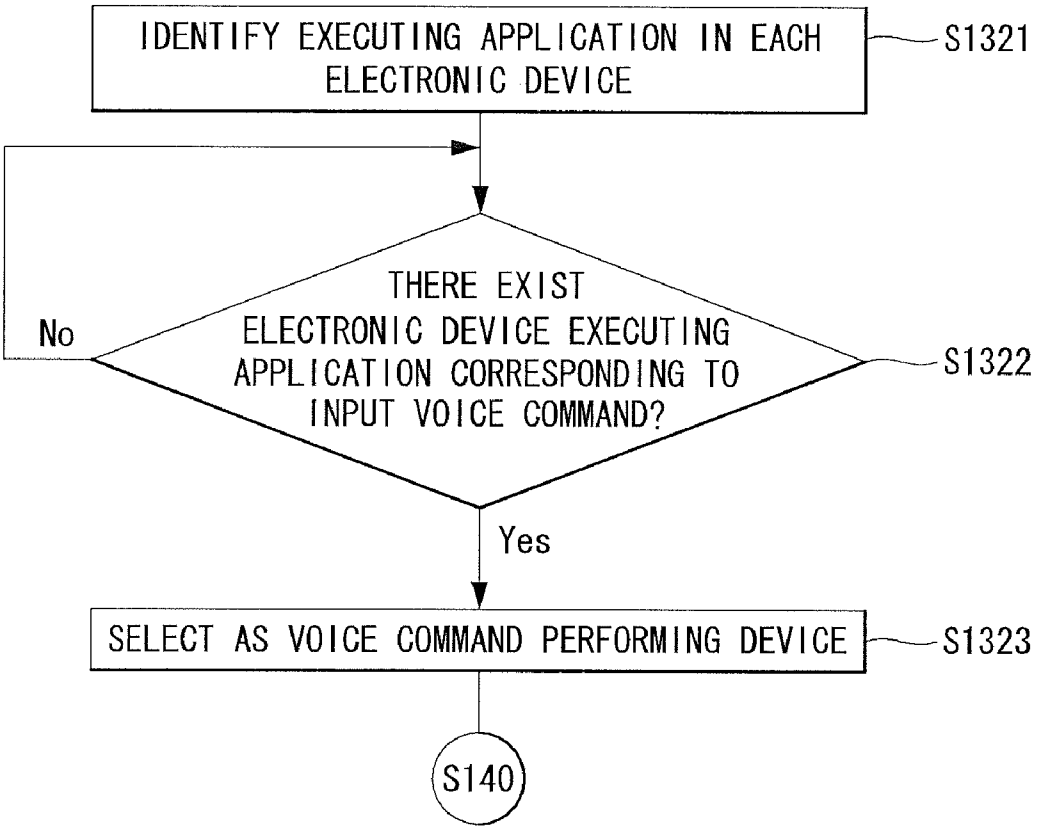

IDENTIFY EXECUTING APPLICATION IN EACH ELECTRONIC DEVICE
S1321
THERE EXIST ELECTRONIC DEVICE EXECUTING APPLICATION CORRESPONDING TO INPUT VOICE COMMAND?
S1322
No
Yes
SELECT AS VOICE COMMAND PERFORMING DEVICE
S1323
S140

Fig 16.

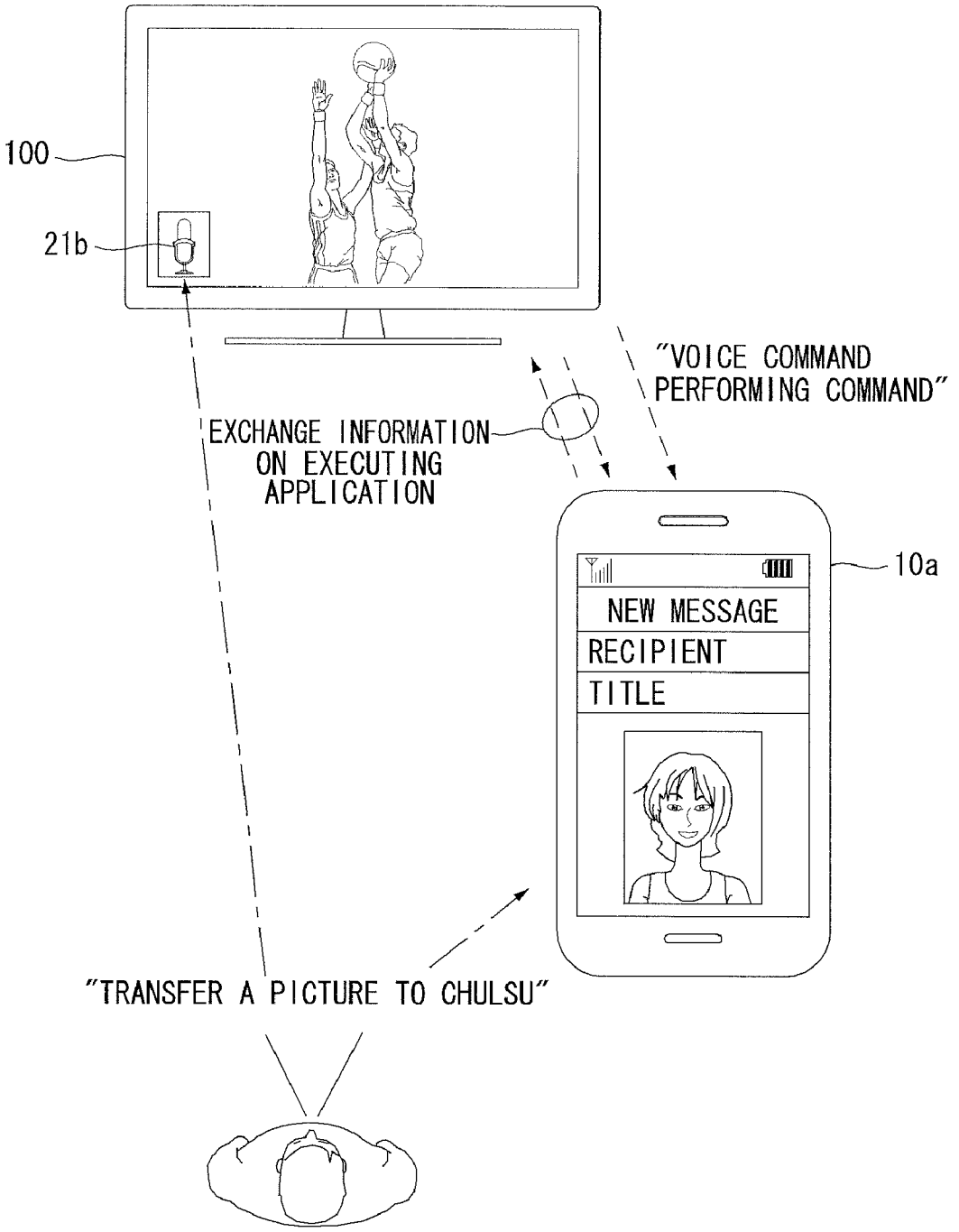

100
21b
"VOICE COMMAND PERFORMING COMMAND"
EXCHANGE INFORMATION ON EXECUTING APPLICATION
10a
NEW MESSAGE
RECIPIENT
TITLE
"TRANSFER A PICTURE TO CHULSU"

Fig 17.

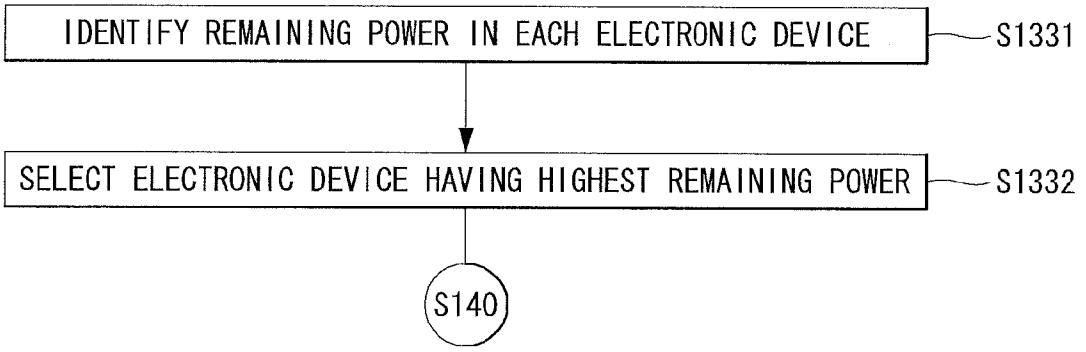

IDENTIFY REMAINING POWER IN EACH ELECTRONIC DEVICE
S1331
SELECT ELECTRONIC DEVICE HAVING HIGHEST REMAINING POWER
S1332
S140

Fig 18.

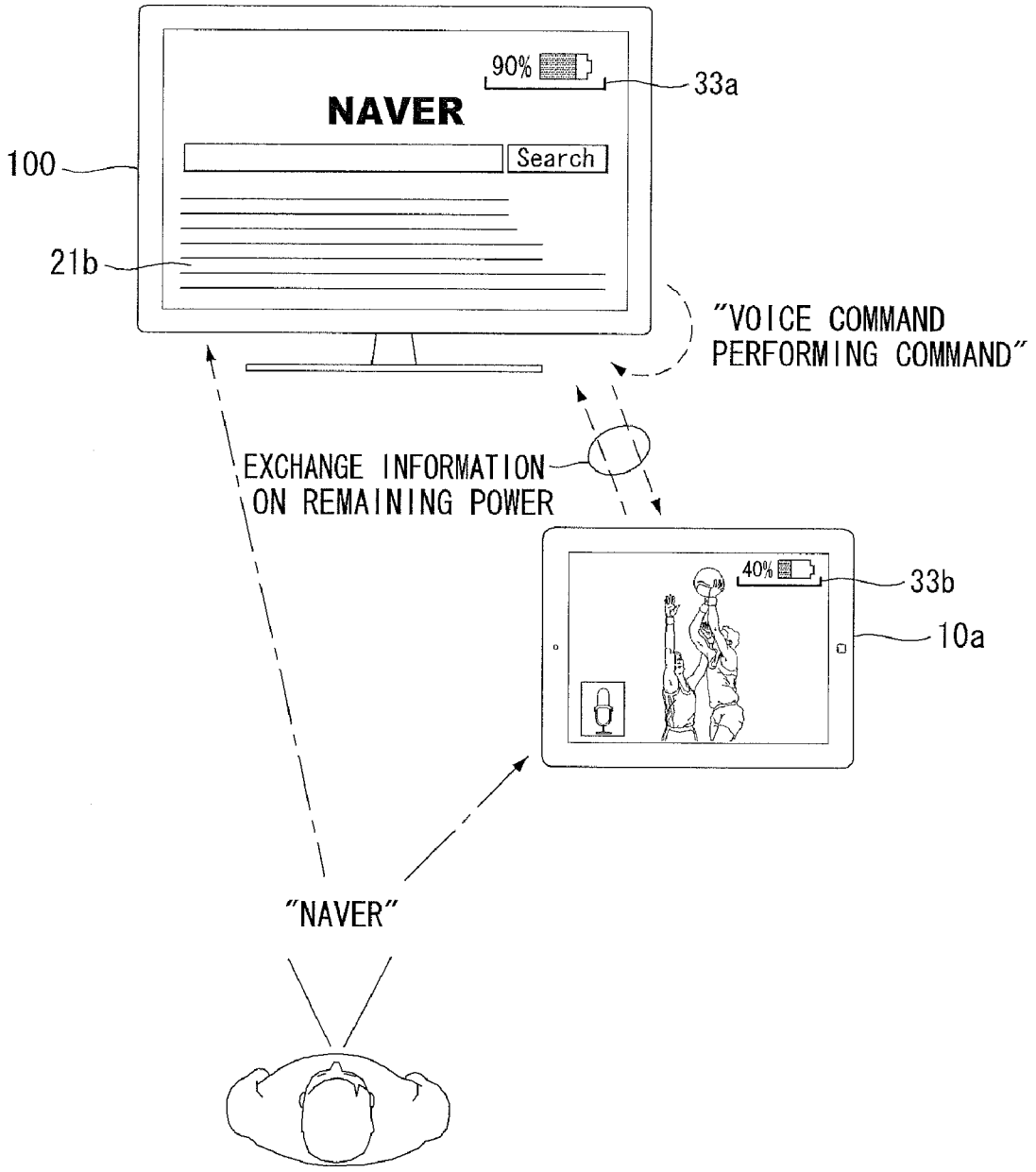

90%
33a
NAVER
Search
100
21b
"VOICE COMMAND
PERFORMING COMMAND"
EXCHANGE INFORMATION
ON REMAINING POWER
40%
33b
10a
"NAVER"

Fig 19.

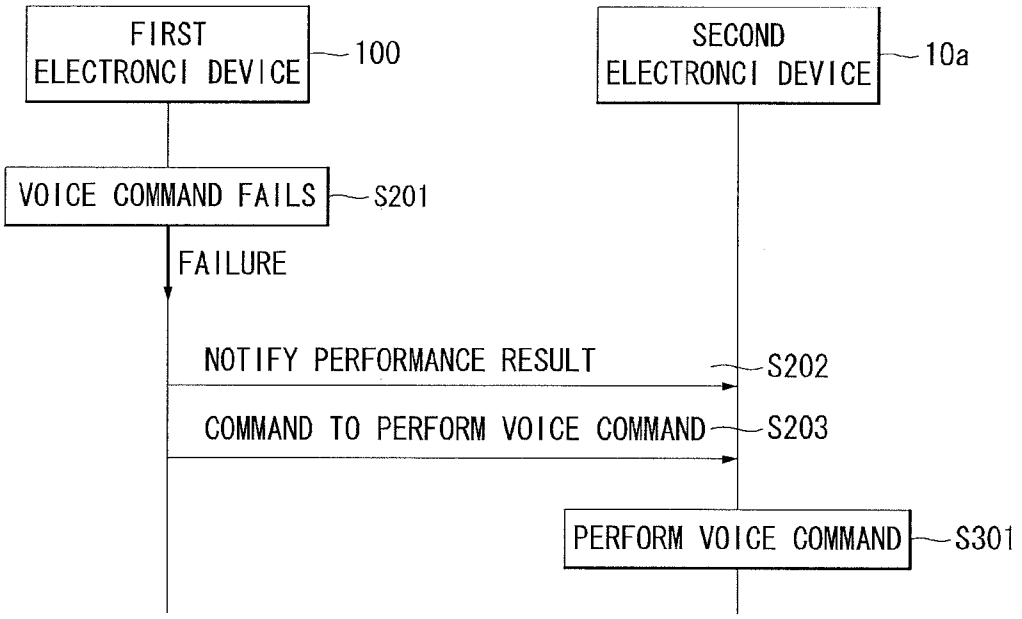

FIRST ELECTRONCI DEVICE
100
SECOND ELECTRONCI DEVICE
10a
VOICE COMMAND FAILS
S201
FAILURE
NOTIFY PERFORMANCE RESULT
S202
COMMAND TO PERFORM VOICE COMMAND
S203
PERFORM VOICE COMMAND
S301

Fig 20.

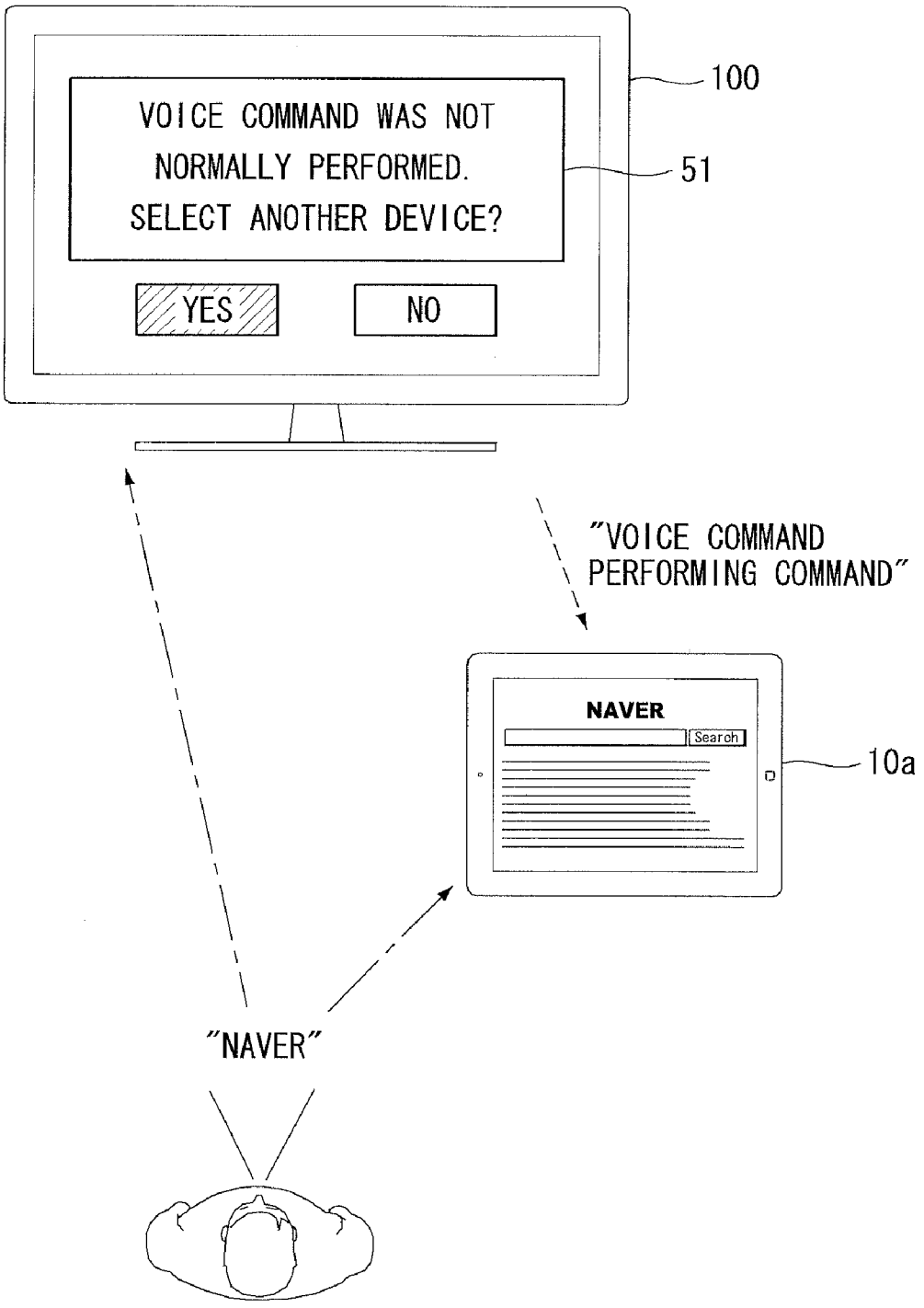

100
VOICE COMMAND WAS NOT
NORMALLY PERFORMED.
SELECT ANOTHER DEVICE?
51
YES
NO
"VOICE COMMAND
PERFORMING COMMAND"
NAVER
Search
10a
"NAVER"

Fig 21.

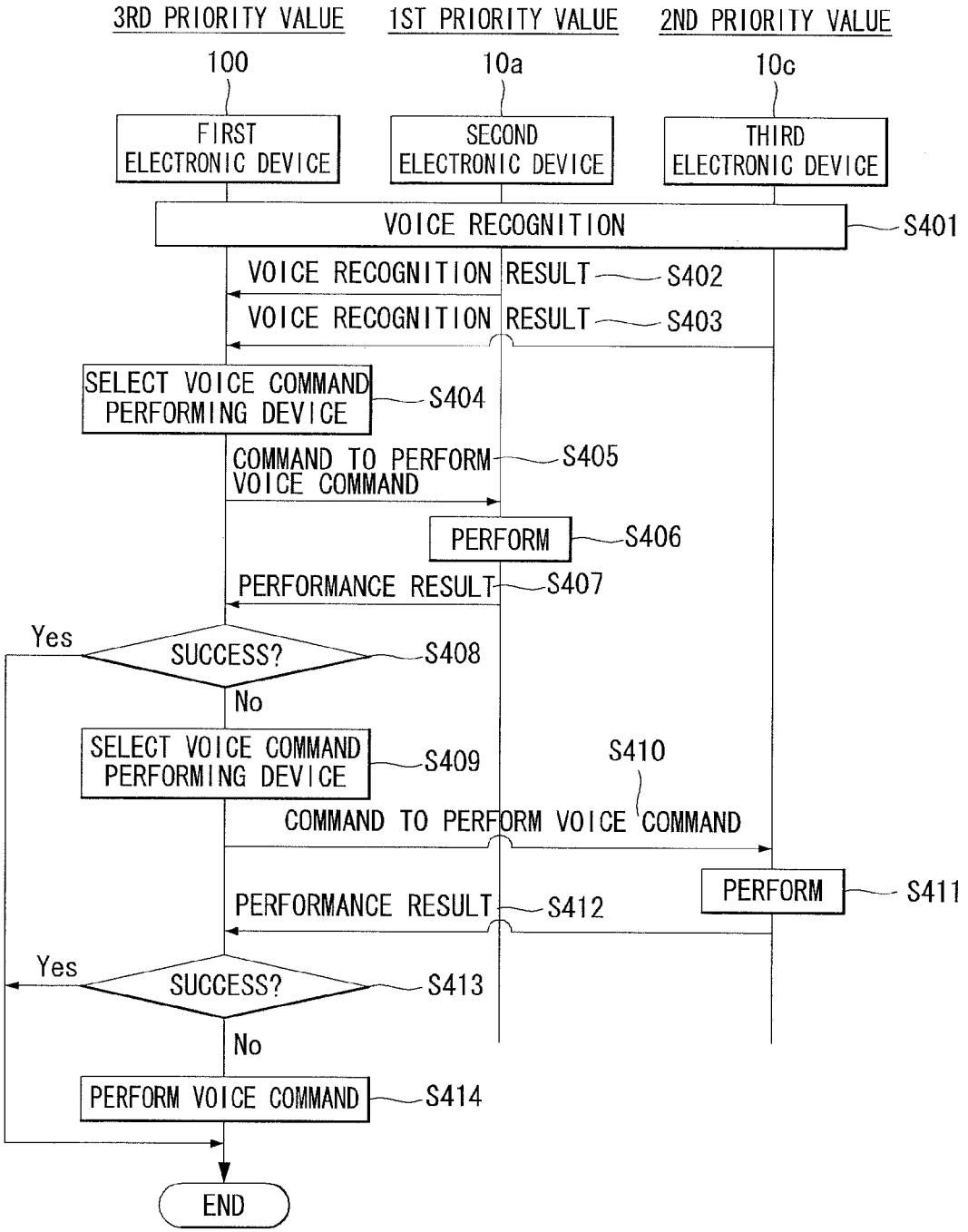
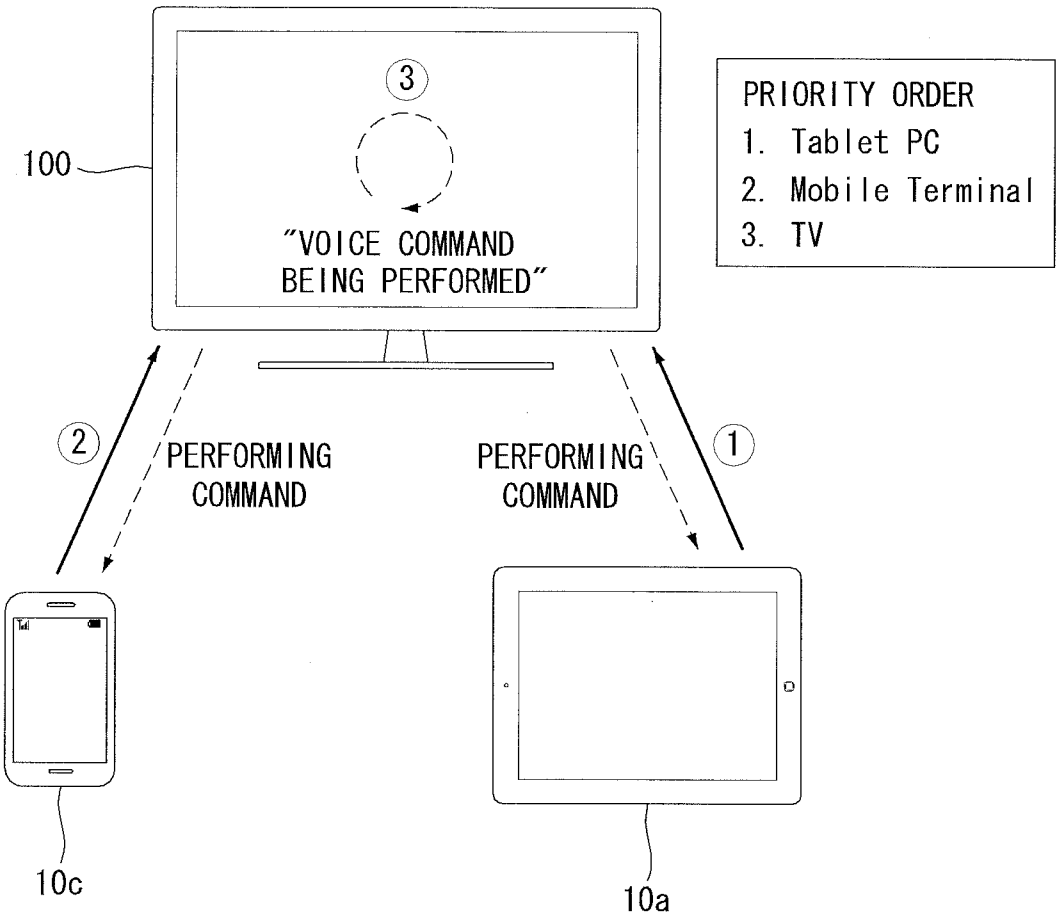

3RD PRIORITY VALUE
1ST PRIORITY VALUE
2ND PRIORITY VALUE
100
10a
10c
FIRST ELECTRONIC DEVICE
SECOND ELECTRONIC DEVICE
THIRD ELECTRONIC DEVICE
VOICE RECOGNITION
S401
VOICE RECOGNITION RESULT
S402
VOICE RECOGNITION RESULT
S403
SELECT VOICE COMMAND PERFORMING DEVICE
S404
COMMAND TO PERFORM VOICE COMMAND
S405
PERFORM
S406
PERFORMANCE RESULT
S407
Yes
SUCCESS?
S408
No
SELECT VOICE COMMAND PERFORMING DEVICE
S409
S410
COMMAND TO PERFORM VOICE COMMAND
PERFORM
S411
PERFORMANCE RESULT
S412
Yes
SUCCESS?
S413
No
PERFORM VOICE COMMAND
S414
END

Fig 22.


100
3
"VOICE COMMAND
BEING PERFORMED"
PRIORITY ORDER
1. Tablet PC
2. Mobile Terminal
3. TV
2
PERFORMING
COMMAND
PERFORMING
COMMAND
1
10c
10a

ELECTRONIC DEVICE AND METHOD FOR CONTROLLING THE SAME

BACKGROUND

[0001] 1. Field

[0002] The embodiments of the present disclosure are directed to an electronic device that can efficiently provide various services in a smart TV environment and a method for controlling the electronic device.

[0003] 2. Related Art

[0004] N screen refers to a user-centered service that allows multi-contents to be seamlessly shared or played anytime and everywhere through a further advanced smart system in the business structure including contents, platforms, networks, and terminals.

[0005] Before N screen appears, three-screen had been prevalent which is limited to a connection among web, mobile, and TVs. As smart devices evolve, technical standards have been developed to let users easily share and execute interpreting services between devices.

[0006] Among them, the DLNA is an industrial standard that permits a user to more easily associate a device with others, and this applies as an inevitable element for smart TVs, smart phones, tablet devices, laptop computers, or audio devices.

[0007] Under the N screen environment, the same contents can be displayed or controlled by a plurality of devices. Accordingly, the same contents can be played by a plurality of devices connected to one another, such as a mobile terminal, a TV, a PC, etc.

[0008] A need exists for various technologies that can control the plurality of electronic devices connected to one another over a network in the N screen environment.

SUMMARY

[0009] Embodiments of the present disclosure provide an electronic device that can efficiently control a plurality of electronic devices capable of voice recognition by means of voice commands in a network environment including the plurality of electronic devices, a system including the same, and a method for controlling the same.

[0010] According to an embodiment of the present disclosure, there is provided an electronic device comprising a communication unit configured to perform communication with at least a first electronic device included in a group of related electronic devices; and a controller configured to: identify, for each electronic device included in the group of related electronic devices, a voice recognition result of a voice command input provided by a user, select, from among the group of related electronic devices, a voice command performing device based on the identified voice recognition results, and control the voice command performing device to perform a function corresponding to the voice command input.

[0011] The electronic device further comprising: a voice input unit configured to input voice command inputs, wherein the electronic device is included in the group of related electronic devices, and wherein the controller is configured to recognize the voice command input provided by the user based on input received through the voice input unit.

[0012] wherein the controller is configured to: identify, for each electronic device included in the group of related electronic devices, a voice recognition result that indicates whether or not recognition of the voice command input was successful at the corresponding electronic device, and select, from among the group of related electronic devices, a voice command performing device based on the identified voice recognition results that indicate whether or not recognition of the voice command input was successful.

[0013] wherein the voice command input provided by the user is a single voice command made by the user, wherein multiple electronic devices included in the group of related electronic devices receive voice input based on the single voice command such that the single voice command results in multiple voice inputs to the group of related electronic devices, and wherein the controller is configured to determine that the multiple voice inputs relate to the single voice command as opposed to multiple voice commands provided by the user.

[0014] wherein the controller is configured to: select, from among the group of related electronic devices, multiple voice command performing devices based on the identified voice recognition results, and control the multiple voice command performing devices to perform a function corresponding to the voice command input.

[0015] wherein the multiple voice command performing devices comprise the electronic device and the first electronic device.

[0016] And wherein the controller is configured to select only one electronic device from the group of related electronic devices as the voice command performing device based on the identified voice recognition results.

[0017] wherein the controller is configured to: identify, for each electronic device included in the group of related electronic devices, a distance from the user; and select the voice command performing device based on the identified distances from the user.

[0018] wherein the controller is configured to: identify, for each electronic device included in the group of related electronic devices, an average voice recognition rate; and select the voice command performing device based on the identified average voice recognition rates.

[0019] wherein the controller is configured to: identify, for each electronic device included in the group of related electronic devices, a type of application executing at a time of the voice command input provided by the user; and select the voice command performing device based on the identified types of applications executing at the time of the voice command input provided by the user.

[0020] wherein the controller is configured to: identify, for each electronic device included in the group of related electronic devices, an amount of battery power remaining; and select the voice command performing device based on the identified amounts of battery power remaining.

[0021] wherein the controller is configured to perform a function corresponding to the voice command input and provide, to the first electronic device, feedback regarding a performance result for the function corresponding to the voice command.

[0022] wherein, when the function corresponding to the voice command input is performed abnormally, the controller is configured to select the first electronic device as the voice command performing device and control the first electronic device to perform the function corresponding to the voice command input.

[0023] wherein the communication unit is configured to communicate with the first electronic device through a Digital Living Network Alliance (DLNA) network.

[0024] According to an embodiment of the present disclosure, there is provided a method for controlling an electronic device comprising: identifying, for each electronic device included in a group of related electronic devices, a voice recognition result of a voice command input provided by a user; selecting, from among the group of related electronic devices, a voice command performing device based on the identified voice recognition results; and outputting a control signal that controls the voice command performing device to perform a function corresponding to the voice command input.

[0025] The method further comprises receiving, at an electronic device included in the group of related electronic devices, the voice command input provided by the user, wherein the electronic device that received the voice command input provided by the user selects the voice command performing device and outputs the control signal.

[0026] According to an embodiment of the present disclosure, there is provided a system comprising: a first electronic device configured to receive a user's voice command; and

[0027] a second electronic device connected to the first electronic device via a network and configured to receive the user's voice command, wherein at least one component of the system is configured to: identify, for each of the first and second electronic devices, a voice recognition result for the user's voice command, select at least one of the first electronic device and the second electronic device as a voice command performing device based on the identified voice recognition results, and control the voice command performing device to perform a function corresponding to the user's voice command.

[0028] wherein the at least one component of the system is configured to select one of the first electronic device and the second electronic device as the voice command performing device based on the voice recognition results.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The embodiments of present disclosure will become more fully understood from the detailed description given herein below and the accompanying drawings, which are given by illustration only, and thus are not limitative of the present disclosure, and wherein:

[0030] FIGS. **1** and **2** are schematic diagrams illustrating a system of electronic devices according to embodiments of the present disclosure;

[0031] FIG. **3** is a conceptual diagram illustrating a Digital Living Network Alliance (DLNA) network according to an embodiment of the present disclosure;

[0032] FIG. **4** illustrates functional components according to the DLNA;

[0033] FIG. **5** is a block diagram illustrating functional components of the DLNA network;

[0034] FIG. **6** illustrates an exemplary system environment for implementing a method for controlling an electronic device according to an embodiment of the present disclosure;

[0035] FIG. **7** is a flowchart illustrating a method for controlling an electronic device according to an embodiment of the present disclosure;

[0036] FIG. **8** is a flowchart for describing step S**120** in greater detail;

[0037] FIG. **9** illustrates an example where a plurality of electronic devices are connected to one another via a network to share voice recognition results between the devices;

[0038] FIG. **10** illustrates an example where a plurality of electronic devices share voice recognition results therebetween and provide results of sharing to a user;

[0039] FIG. **11** is a flowchart illustrating an example of selecting an electronic device to conduct voice commands according to an embodiment of the present disclosure;

[0040] FIG. **12** illustrates an example where a voice command is performed by the electronic device selected in FIG. **11**;

[0041] FIG. **13** is a flowchart illustrating an example of selecting an electronic device to perform voice commands according to an embodiment of the present disclosure;

[0042] FIG. **14** illustrates an example where a voice command is performed by the electronic device selected in FIG. **13**;

[0043] FIG. **15** is a flowchart illustrating an example of selecting an electronic device to perform voice commands according to an embodiment of the present disclosure;

[0044] FIG. **16** illustrates an example where a voice command is performed by the electronic device selected in FIG. **15**;

[0045] FIG. **17** is a flowchart illustrating an example of selecting an electronic device to perform voice commands according to an embodiment of the present disclosure;

[0046] FIG. **18** illustrates an example where a voice command is performed by the electronic device selected in FIG. **17**;

[0047] FIG. **19** is a flowchart illustrating a method for controlling an electronic device according to an embodiment of the present disclosure;

[0048] FIG. **20** is a view for describing the embodiment shown in FIG. **19**;

[0049] FIG. **21** is a flowchart illustrating a method for controlling an electronic device according to an embodiment of the present disclosure; and

[0050] FIG. **22** is a view for describing the embodiment shown in FIG. **21**.

DETAIL DESCRIPTION

[0051] The embodiments of the present disclosure described in detail above will be more clearly understood by the following detailed description. In what follows, the embodiments of the present disclosure will be described in detail with reference to appended drawings. Throughout the document, the same reference number refers to the same element. In addition, if it is determined that specific description about a well-known function or structure related to the present disclosure unnecessarily brings ambiguity to the understanding of the technical principles of the present disclosure, the corresponding description will be omitted.

[0052] In what follows, a display device related to the present disclosure will be described in more detail with reference to the appended drawings. The suffix of "module" and "unit" associated with a constituting element employed for the description below does not carry a meaning or a role in itself distinguished from the other.

[0053] FIG. **1** is a schematic diagram illustrating a system of electronic devices according to an embodiment of the present disclosure. FIG. **2** is another schematic diagram illustrating the system of electronic devices according to an embodiment of the present disclosure.

[0054] Referring to FIGS. **1** and **2**, a system environment includes the mobile terminal **100**, a plurality of electronic devices **100**, **10**, a network **200**, and a server **300** connected to the network **200**.

[0055] Referring to FIG. **1**, electronic devices **100** and the plurality of external electronic devices **10** can each communicate with the network **200**. For example, electronic devices **100** and the plurality of external electronic devices **10** can receive multimedia content from the server **300**.

[0056] The network **200** may include at least a mobile communications network, wired or wireless Internet, or a broadcast network.

[0057] The plurality of electronic devices **100**, **10** may include at least stationary or mobile terminals. For example, the plurality of electronic devices **100**, **10** may include handheld phones, smart phones, computers, laptop computers, personal digital assistants (PDAs), portable multimedia players (PMPs), personal navigation devices, or mobile Internet devices (MIDs).

[0058] The plurality of electronic devices **100** and **10** include a first electronic device **100**, a second electronic device **10***a*, a third electronic device **10***b*, and a fourth electronic device **10***c*.

[0059] For purposes of illustration, as shown in FIGS. **1** and **2**, the first, second, third, and fourth electronic devices **100**, **10***a*, **10***b*, and **10***c* are a DTV (Digital TV), a mobile terminal, such as a tablet PC, a mobile terminal, such as a mobile phone, and a personal computer or laptop computer, respectively.

[0060] FIG. **3** is a conceptual diagram illustrating a Digital Living Network Alliance (DLNA) network according to an embodiment of the present disclosure. The DLNA is an organization that creates standards for sharing content, such as music, video, or still images between electronic devices over a network. The DLNA is based on the Universal Plug and Play (UPnP) protocol.

[0061] The DLNA network **400** may comprise a digital media server (DMS) **410**, a digital media player (DMP) **420**, a digital media render (DMR) **430**, and a digital media controller (DMC) **440**.

[0062] The DLNA network **400** may include at least the DMS **410**, DMP **420**, DMR **430**, or DMC **440**. The DLNA may provide a standard for compatibility between each of the devices. Moreover, the DLNA network **300** may provide a standard for compatibility between the DMS **410**, the DMP **420**, the DMR **430**, and the DMC **440**.

[0063] The DMS **410** can provide digital media content. That is, the DMS **410** is able to store and manage the digital media content. The DMS **410** can receive various commands from the DMC **440** and perform the received commands. For example, upon receiving a play command, the DMS **410** can search for content to be played back and provide the content to the DMR **430**. The DMS **410** may comprise a personal computer (PC), a personal video recorder (PVR), and a set-top box, for example.

[0064] The DMP **420** can control either content or electronic devices, and can play back the content. That is, the DMP **420** is able to perform the function of the DMR **430** for content playback and the function of the DMC **440** for control of other electronic devices. The DMP **420** may comprise a television (TV), a digital TV (DTV), and a home sound theater, for example.

[0065] The DMR **430** can play back the content received from the DMS **410**. The DMR **430** may comprise a digital photo frame.

[0066] The DMC **440** may provide a control function for controlling the DMS **410**, the DMP **420**, and the DMR **430**. The DMC **440** may comprise a handheld phone and a PDA, for example.

[0067] In some embodiments, the DLNA network **300** may comprise the DMS **410**, the DMR **430**, and the DMC **440**. In other embodiments, the DLNA network **300** may comprise the DMP **420** and the DMR **430**.

[0068] In addition, the DMS **410**, the DMP **420**, the DMR **430**, and the DMC **440** may serve to functionally discriminate the electronic devices from each other. For example, if a handheld phone has a playback function as well as a control function, the handheld phone may be the DMP **420**. Alternatively, the DTV may be configured to manage content and, therefore, the DTV may serve as the DMS **410** as well as the DMP **420**.

[0069] In some embodiments, the plurality of electronic devices **100**, **10** may constitute the DLNA network **400** while performing the function corresponding to at least the DMS **410**, the DMP **420**, the DMR **430**, or the DMC **440**.

[0070] FIG. **5** is a block diagram illustrating functional components of the DLNA network. The functional components of the DLNA may comprise a media format layer, a media transport layer, a device discovery & control and media management layer, a network stack layer, and a network connectivity layer.

[0071] The media format layer may use images, audio, audio-video (AV) media, and Extensible Hypertext Markup Language (XHTML) documents.

[0072] The media transport layer may use a Hypertext Transfer Protocol (HTTP) 1.0/1.1 networking protocol for streaming playback over a network. Alternatively, the media transport layer may use a real-time transport protocol (RTP) networking protocol.

[0073] The device discovery & control and media management layer may be directed to UPnP AV Architecture or UPnP Device Architecture. For example, a simple service discovery protocol (SSDP) may be used for device discovery on the network. Moreover, a simple object access protocol (SOAP) may be used for control.

[0074] The network stack layer may use an Internet Protocol version 4 (IPv4) networking protocol. Alternatively, the network stack layer may use an IPv6 networking protocol.

[0075] The network connectivity layer may comprise a physical layer and a link layer of the network. The network connectivity layer may further include at least Ethernet, WiFi, or Bluetooth®. Moreover, a communication medium capable of providing an IP connection may be used.

[0076] Hereinafter, for purposes of illustration, an example is described where the first electronic device **100** is a TV including a DTV, an IPTV, etc. As used herein, the terms "module" and "unit" either may be used to denote a component without distinguishing one from the other.

[0077] FIG. **5** is a block diagram of the electronic device **100** according to an embodiment of the present disclosure. As shown, the electronic device **100** includes a communication unit **110**, an A/V (Audio/Video) input unit **120**, an output unit **150**, a memory **160**, an interface unit **170**, a controller **180**, and a power supply unit **190**, etc. FIG. **5** shows the electronic device as having various components, but implementing all of the illustrated components is not a requirement. Greater or fewer components may alternatively be implemented.

[0078] In addition, the communication unit **110** generally includes one or more components allowing radio communi-

cation between the electronic device **100** and a communication system or a network in which the electronic device is located. For example, in FIG. **5**, the communication unit includes at least one of a broadcast receiving module **111**, a wireless Internet module **113**, a short-range communication module **114**.

[0079] The broadcast receiving module **111** receives broadcast signals and/or broadcast associated information from an external broadcast management server via a broadcast channel. Further, the broadcast channel may include a satellite channel and/or a terrestrial channel. The broadcast management server may be a server that generates and transmits a broadcast signal and/or broadcast associated information or a server that receives a previously generated broadcast signal and/or broadcast associated information and transmits the same to a terminal. The broadcast signal may include a TV broadcast signal, a radio broadcast signal, a data broadcast signal, and the like. Also, the broadcast signal may further include a broadcast signal combined with a TV or radio broadcast signal.

[0080] In addition, the broadcast associated information may refer to information associated with a broadcast channel, a broadcast program or a broadcast service provider.

[0081] Further, the broadcast signal may exist in various forms. For example, the broadcast signal may exist in the form of an electronic program guide (EPG) of the digital multimedia broadcasting (DMB) system, and electronic service guide (ESG) of the digital video broadcast-handheld (DVB-H) system, and the like.

[0082] The broadcast receiving module **111** may also be configured to receive signals broadcast by using various types of broadcast systems. In particular, the broadcast receiving module **111** can receive a digital broadcast using a digital broadcast system such as the multimedia broadcasting-terrestrial (DMB-T) system, the digital multimedia broadcasting-satellite (DMB-S) system, the digital video broadcast-handheld (DVB-H) system, the data broadcasting system known as the media forward link only (MediaFLO®), the integrated services digital broadcast-terrestrial (ISDB-T) system, etc.

[0083] The broadcast receiving module **111** can also be configured to be suitable for all broadcast systems that provide a broadcast signal as well as the above-mentioned digital broadcast systems. In addition, the broadcast signals and/or broadcast-associated information received via the broadcast receiving module **111** may be stored in the memory **160**.

[0084] The Internet module **113** supports Internet access for the electronic device and may be internally or externally coupled to the electronic device. The wireless Internet access technique implemented may include a WLAN (Wireless LAN) (Wi-Fi), Wibro (Wireless broadband), Wimax (World Interoperability for Microwave Access), HSDPA (High Speed Downlink Packet Access), or the like.

[0085] Further, the short-range communication module **114** is a module for supporting short range communications. Some examples of short-range communication technology include Bluetooth™, Radio Frequency IDentification (RFID), Infrared Data Association (IrDA), Ultra-WideBand (UWB), ZigBee™, and the like.

[0086] With reference to FIG. **5**, the A/V input unit **120** is configured to receive an audio or video signal, and includes a camera **121** and a microphone **122**. The camera **121** processes image data of still pictures or video obtained by an image capture device in a video capturing mode or an image capturing mode, and the processed image frames can then be displayed on a display unit **151**.

[0087] Further, the image frames processed by the camera **121** may be stored in the memory **160** or transmitted via the communication unit **110**. Two or more cameras **121** may also be provided according to the configuration of the electronic device.

[0088] In addition, the microphone **122** can receive sounds via a microphone in a phone call mode, a recording mode, a voice recognition mode, and the like, and can process such sounds into audio data. The microphone **122** may also implement various types of noise canceling (or suppression) algorithms to cancel or suppress noise or interference generated when receiving and transmitting audio signals.

[0089] In addition, the output unit **150** is configured to provide outputs in a visual, audible, and/or tactile manner. In the example in FIG. **5**, the output unit **150** includes the display unit **151**, an audio output module **152**, an alarm module **153**, a vibration module **154**, and the like. In more detail, the display unit **151** displays information processed by the image electronic device **100**. For examples, the display unit **151** displays UI or graphic user interface (GUI) related to a displaying image. The display unit **151** displays a captured or/and received image, UI or GUI when the image electronic device **100** is in the video mode or the photographing mode.

[0090] The display unit **151** may also include at least one of a Liquid Crystal Display (LCD), a Thin Film Transistor-LCD (TFT-LCD), an Organic Light Emitting Diode (OLED) display, a flexible display, a three-dimensional (3D) display, or the like. Some of these displays may also be configured to be transparent or light-transmissive to allow for viewing of the exterior, which is called transparent displays.

[0091] An example transparent display is a TOLED (Transparent Organic Light Emitting Diode) display, or the like. A rear structure of the display unit **151** may be also light-transmissive. Through such configuration, the user can view an object positioned at the rear side of the terminal body through the region occupied by the display unit **151** of the terminal body.

[0092] The audio output unit **152** can output audio data received from the communication unit **110** or stored in the memory **160** in a audio signal receiving mode and a broadcasting receiving mode. The audio output unit **152** outputs audio signals related to functions performed in the image electronic device **100**. The audio output unit **152** may comprise a receiver, a speaker, a buzzer, etc.

[0093] The alarm module **153** generates a signal for informing an event generated from the electronic device **100**. The event generated from the electronic device **100** may include a speaker's voice input, a gesture input, a message input, and various control inputs through a remote controller. The alarm module **153** may also generate a signal for informing the generation of an event in other forms (e.g., vibration) other than a video signal or an audio signal. The video signal or the audio signal may also be generated through the display unit **151** or the audio output module **152**.

[0094] The vibration module **154** can generate particular frequencies inducing a tactile sense due to particular pressure and feedback vibrations having a vibration pattern corresponding to the pattern of a speaker's voice input through a voice input device; and transmit the feedback vibrations to the speaker.

[0095] The memory **160** can store a program for describing the operation of the controller **180**; the memory **160** can also store input and output data temporarily. The memory **160** can store data about various patterns of vibration and sound corresponding to at least one voice pattern input from at least one speaker.

[0096] Further, the memory **160** can store an electronic program guide (EPG). The EPG includes schedules for broadcasts to be on air and other various information, such as titles of broadcast programs, names of broadcast stations, broadcast channel numbers, synopses of broadcast programs, reservation numbers of broadcast programs, and actors appearing in broadcast programs.

[0097] The memory **160** periodically receives through the communication unit **110** an EPG regarding terrestrial, cable, and satellite broadcasts transmitted from broadcast stations or receives and stores an EPG pre-stored in the external device **10** or **20**. The received EPG can be updated in the memory **160**. For instance, the first electronic device **100** includes a separate database (not shown) for storing the EPG, and data relating to the EPG are separately stored in an EPG database (not shown).

[0098] Furthermore, the memory **160** may include an audio model, a recognition dictionary, a translation database, a predetermined language model, and a command database which are necessary for the operation of the present disclosure.

[0099] The recognition dictionary can include at least one form of a word, a clause, a keyword, and an expression of a particular language.

[0100] The translation database can include data matching multiple languages to one another. For example, the translation database can include data matching a first language (Korean) and a second language (English/Japanese/Chinese) to each other. The second language is a terminology introduced to distinguish from the first language and can correspond to multiple languages. For example, the translation database can include data matching "예약하고 싶습니다" in Korean to "I'd like to make a reservation" in English.

[0101] The command databases form a set of commands capable of controlling the electronic device **100**. The command databases may exist in independent spaces according to content to be controlled. For example, the command databases may include a channel-related command database for controlling a broadcasting program, a map-related to command database for controlling a navigation program, a game-related command database for controlling a game program.

[0102] Each of one or more commands included in each of the channel-related command database, the map-related command database, and the game-related command database has a different subject of control.

[0103] For example, in "Channel Switch Command" belonging to the channel-related command database, a broadcasting program is the subject of control. In a "Command for Searching for the Path of the Shortest Distance" belonging to the map-related command database, a navigation program is the subject of control.

[0104] Kinds of the command databases are not limited to the above example, and they may exist according to the number of pieces of content which may be executed in the electronic device **100**.

[0105] Meanwhile, the command databases may include a common command database. The common command database is not a set of commands for controlling a function unique to specific content being executed in the electronic device **100**, but a set of commands which can be in common applied to a plurality of pieces of content.

[0106] For example, assuming that two pieces of content being executed in the electronic device **100** are game content and a broadcasting program, a voice command spoken in order to raise the volume during play of the game content may be the same as a voice command spoken in order to raise the volume while the broadcasting program is executed.

[0107] The memory **160** may also include at least one type of storage medium including a flash memory, a hard disk, a multimedia card micro type, a card-type memory (e.g., SD or DX memory, etc), a Random Access Memory (RAM), a Static Random Access Memory (SRAM), a Read-Only Memory (ROM), an Electrically Erasable Programmable Read-Only Memory (EEPROM), a Programmable Read-Only memory (PROM), a magnetic memory, a magnetic disk, and an optical disk. Also, the electronic device **100** may be operated in relation to a web storage device that performs the storage function of the memory **160** over the Internet.

[0108] Also, the interface unit **170** serves as an interface with external devices connected with the electronic device **100**. For example, the external devices can transmit data to an external device, receive and transmit power to each element of the electronic device **100**, or transmit internal data of the electronic device **100** to an external device. For example, the interface unit **170** may include wired or wireless headset ports, external power supply ports, wired or wireless data ports, memory card ports, ports for connecting a device having an identification module, audio input/output (I/O) ports, video I/O ports, earphone ports, or the like.

[0109] The controller **180** usually controls the overall operation of a electronic device. For example, the controller **180** carries out control and processing related to image display, voice output, and the like. The controller **10** can further comprise a voice recognition unit **182** carrying out voice recognition upon the voice of at least one speaker and although not shown, a voice synthesis unit (not shown), a sound source detection unit (not shown), and a range measurement unit (not shown) which measures the distance to a sound source.

[0110] The voice recognition unit **182** can carry out voice recognition upon voice signals input through the microphone **122** of the electronic device **100** or the remote control **10** and/or the mobile terminal shown in FIG. **1**; the voice recognition unit **182** can then obtain at least one recognition candidate corresponding to the recognized voice. For example, the voice recognition unit **182** can recognize the input voice signals by detecting voice activity from the input voice signals, carrying out sound analysis thereof, and recognizing the analysis result as a recognition unit. And the voice recognition unit **182** can obtain the at least one recognition candidate corresponding to the voice recognition result with reference to the recognition dictionary and the translation database stored in the memory **160**.

[0111] The voice synthesis unit (not shown) converts text to voice by using a TTS (Text-To-Speech) engine. TTS technology converts character information or symbols into human speech. TTS technology constructs a pronunciation database for each and every phoneme of a language and generates continuous speech by connecting the phonemes. At this time, by adjusting magnitude, length, and tone of the speech, a natural voice is synthesized; to this end, natural language processing technology can be employed. TTS technology can be easily found in the electronics and telecommunication

devices such as CTI, PC, PDA, and mobile devices; and consumer electronics devices such as recorders, toys, and game devices. TTS technology is also widely used for factories to improve productivity or for home automation systems to support much comfortable living. Since TTS technology is one of well-known technologies, further description thereof will not be provided.

[0112] A power supply unit **190** provides power required for operating each constituting element by receiving external and internal power controlled by the controller **180**.

[0113] Also, the power supply unit **190** receives external power or internal power and supplies appropriate power required for operating respective elements and components under the control of the controller **180**.

[0114] Further, various embodiments described herein may be implemented in a computer-readable or its similar medium using, for example, software, hardware, or any combination thereof.

[0115] For a hardware implementation, the embodiments described herein may be implemented by using at least one of application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, micro-controllers, microprocessors, electronic units designed to perform the functions described herein. In some cases, such embodiments may be implemented by the controller **180** itself.

[0116] For a software implementation, the embodiments such as procedures or functions described herein may be implemented by separate software modules. Each software module may perform one or more functions or operations described herein. Software codes can be implemented by a software application written in any suitable programming language. The software codes may be stored in the memory **160** and executed by the controller **180**.

[0117] FIG. **6** illustrates an exemplary system environment for implementing a method for controlling an electronic device according to an embodiment of the present disclosure.

[0118] Referring to FIG. **6**, a user can receive predetermined contents through the plurality of electronic devices **100** and **10***a*. The same or different contents can be provided to the electronic devices **100** and **10***a* that are connected to each other.

[0119] Referring to FIG. **6**, while receiving the same content, the TV **100** and tablet PC **10***a* receive a predetermined voice command (for example, "next channel") from the user.

[0120] The TV **100** and the tablet PC **10***a* are driven under the same operating system (OS) and have the same voice recognition module for recognizing the user's voice commands. Accordingly, the TV **100** and the tablet PC **10***a* generates the same output in response to the user's voice command.

[0121] For example, in the event that the user makes a voice command by saying "next channel" while a first broadcast program is provided to the TV **100** and the tablet PC **10***a*, both the TV **100** and the tablet PC **10***a* can change the channels from the first broadcast program to a second broadcast program. However, that the plurality of devices simultaneously process the use's voice command may cause a multi process to be unnecessarily performed. Accordingly, the voice command needs to be conducted by one of the TV **100** and the tablet PC **10***a*.

[0122] In an environment involving a plurality of devices, it can be determined by communication between the devices or by a third device managing the plurality of devices which of the plurality of devices is to carry out a user's voice command.

[0123] A microphone included in the TV **100** or tablet PC **10***a* can function as an input means that receives the user's voice command. According to an embodiment, the input means includes a microphone included in the remote controller **50** for controlling the TV **100** or included in the user's mobile phone **10**. The remote controller **50** and the mobile phone **10** can perform near-field wireless communication with the TV **100** or the tablet PC **10***a*.

[0124] It has been heretofore described that in a system environment in which a plurality of electronic devices are connected to each other over a network, a specific electronic device handles a user's voice command.

[0125] Hereinafter, a method for controlling an electronic device according to an embodiment of the present disclosure is described with reference to the drawings. Specifically, examples are described where in a system environment involving a plurality of electronic devices, one electronic device conducts a user's voice command.

[0126] FIG. **7** is a flowchart illustrating a method for controlling an electronic device according to an embodiment of the present disclosure.

[0127] Referring to FIGS. **6** and **7**, the first electronic device **100** receives a user's voice command in the device environment as shown in FIG. **6** (S**100**). For example, the TV **100** receives a voice command saying "next channel" from the user. Other electronic devices (for example, the tablet PC **10***a*) than the first electronic device **100**, which are connected to the first electronic device over a network, may receive the user's voice command.

[0128] The controller **180** of the first electronic device **100** performs a voice recognition process in response to the received voice command (S**110**).

[0129] Likewise, the other electronic devices connected to the first electronic device **100** via the network may perform the voice recognition process in response to the voice command. For purposes of illustration, the voice command received by the other electronic devices is the same as the voice command received by the first electronic device **100**.

[0130] Thereafter, the controller **180** of the first electronic device **100** receives a result of the voice recognition for the same voice command as the voice command received from at least one of the other electronic devices connected to the first electronic device **100** through the network (S**120**).

[0131] The voice recognition result received from the other electronic devices includes acknowledge information regarding whether the other electronic devices have normally received and recognized the user's voice command (also referred to as "Ack signal"). For example, when any one of the other electronic devices fails to normally receive or recognize the user's voice command, the electronic device needs to be excluded while selecting an electronic device to perform voice commands (also referred to as "voice command performing device" throughout the specification and the drawings) since it cannot carry out the user's voice commands.

[0132] Accordingly, the first electronic device **100** and the second electronic device **10***a* as shown in FIG. **6** need share the voice recognition results by exchanging the results therebetween.

[0133] The voice recognition result received from the other electronic devices includes information on time that the user's voice command was entered. For instance, when the first electronic device **100** receives a first voice command at a first time and the second electronic device **10***a* receives the first voice command at a second time, there might be a tiny difference in the time of recognizing the voice command in consideration of a distance difference between the two devices. However, when the time difference exceeds a predetermined interval, it is difficult to determine the voice command as being generated by the same user at the same time.

[0134] Accordingly, in sharing the voice recognition results between a plurality of devices, time information received from the devices may be taken into consideration. For instance, when a difference in input time between two devices is within a predetermined interval, the controller **180** may determine that the user voice commands have been input at the same time. In contrast, when the difference in input time is more than the predetermined interval, the controller **180** may determine that the voice command input at the first time has been reentered at the second time. The controlling method for an electronic device according to the embodiments of the present disclosure may apply to the former situation.

[0135] The voice command result received from the other electronic devices may include a magnitude (gain value) of the recognized voice signal, voice recognition ratio of each device, type of content or application in execution by each device upon voice recognition, and remaining power.

[0136] The controller **180** of the first electronic device **100** selects a device to perform the voice command based on the voice recognition result shared with the other electronic devices (S**130**).

[0137] A process of determining whether any electronic device performs the voice command based on information relating to various recognition results received from the other electronic devices will be described later.

[0138] Then, the controller **180** of the first electronic device **100** outputs a control signal of controlling the selected device to perform a function corresponding to the received voice command (S**140**).

[0139] The device that can be selected by the controller **180** of the first electronic device **100** to perform the voice command includes the first electronic device **100** or some other electronic device connected to the first electronic device **100** via a predetermined network.

[0140] Accordingly, when the first electronic device **100** is selected to perform the voice command, the controller **180** may enable the first electronic device **100** to directly perform a function corresponding to the voice command. When any one of the other electronic devices connected to the first electronic device **100** via the network is selected to perform the voice command, the controller **180** of the first electronic device **100** may transfer a control command enabling the selected electronic device to perform the function corresponding to the voice command.

[0141] Although the controller **180** of the first electronic device **100** automatically selects a device to perform the voice command based on the voice recognition result for each device in step S**130**, the embodiments of the present disclosure are not limited thereto. For instance, while the voice recognition result for each device is displayed on the display unit, a user may select a device to perform the voice command based on the displayed result.

[0142] FIG. **8** is a flowchart for describing step S**120** in greater detail.

[0143] Referring to FIG. **8**, the controller **180** receives voice recognition results for the same voice command as a voice command input to the first electronic device **100** from other electronic devices connected to the first electronic device **100** via a network.

[0144] Then, the first electronic device **100** identifies whether the voice recognition has been successfully done based on the voice recognition result (S**121**). When the successful voice recognition has been done, step S**130** is carried out.

[0145] However, when the voice recognition has failed, the controller **180** of the first electronic device **100** excludes the device having failed the voice recognition from candidate devices to perform the voice command (S**122**).

[0146] For instance, referring to FIG. **6**, in response to a user's voice command saying "next channel", the first electronic device **100** and the second electronic device **10***a* perform the voice command and then exchanges results therebetween. The first electronic device **100** receives the voice recognition result for the second electronic device **10***a* and, if the second electronic device **10***a* has failed to recognize the "next channel", the controller **180** of the first electronic device **100** excludes the second electronic device **10***a* from the candidate devices to perform the voice command.

[0147] The first electronic device **100** may search the other electronic devices than the second electronic device **10***a* over the network to which the first electronic device **100** connects. When there are no other devices than the second electronic device **10***a* over the network, the controller **180** of the first electronic device **100** directly carries out the voice command.

[0148] FIG. **9** illustrates an example where a plurality of electronic devices are connected to one another via a network to share voice recognition results between the devices.

[0149] For purposes of illustration, the first electronic device **100** is a TV, the second electronic device **10***a* is a tablet PC, and the third electronic device **10***c* is a mobile phone.

[0150] Referring to FIG. **9**, a user generates a voice command by saying "next channel".

[0151] In response to the voice command, the TV **100**, the tablet PC **10***a*, and the mobile phone **10***c* perform voice recognition. Each of the devices **100**, **10***a*, and **10***c* may share voice recognition results with other electronic devices connected thereto via the network. The voice recognition results as shared include whether the voice recognition has succeeded or failed. Based on the shared results, each electronic may identify that the mobile phone **10***c* has failed while the TV **100** and the tablet PC **10***a* have succeeded.

[0152] Although the first electronic device, i.e. TV **100**, has been selected to perform the voice command, other electronic devices may also be selected as a device for conducting the voice command. For example, a specific electronic device may be preset to carry out the user's voice command according to settings of a network in which a plurality of electronic devices are included.

[0153] FIG. **10** illustrates an example where a plurality of electronic devices share voice recognition results therebetween and provide results of sharing to a user.

[0154] Referring to FIGS. **9** and **10**, each electronic device displays identification information **31** indicating voice recognition results of the other electronic devices on the screen.

The identification information **31** includes device IDs **100'**, **10***a*', and **10***c*' and information indicating whether the voice recognition succeeds or not.

[0155] The device IDs **100'**, **10***a*', and **10***c*' include icons, such as a TV icon, a mobile phone icon, and a tablet PC icon.

[0156] The information indicating whether the voice recognition succeeds includes information indicating a success or failure of the voice recognition. For example, the information indication a success or failure of the voice recognition may be represented by highlighting the device ID (the TV icon, mobile phone icon, or tablet PC icon) or by using text message or graphic images.

[0157] As identification information on any one device is selected by a user's manipulation while the identification information on the devices are displayed, the controller **180** of the first electronic device **100** may select the device corresponding to the selected identification device as a device to conduct the user's voice command.

[0158] Hereinafter, various embodiments where the controller **180** of the first electronic device **100** chooses an electronic device to perform voice commands are described with reference to relating drawings.

[0159] FIG. **11** is a flowchart illustrating an example of selecting an electronic device to conduct voice commands according to an embodiment of the present disclosure. FIG. **12** illustrates an example where a voice command is performed by the electronic device selected in FIG. **11**.

[0160] Referring to FIGS. **11** and **12**, the controller **180** of the first electronic device **100** selects an electronic device to perform voice commands based on voice recognition results received from other electronic devices connected thereto over a network.

[0161] According to an embodiment, the controller **180** may select an electronic device located close to a user as conducting voice commands (S**131**).

[0162] The distances between the user and electronic devices may be compared therebetween based on the gain of a voice signal received for each electronic device.

[0163] Referring to FIG. **12**, while in execution of first content C**1**, the first electronic device **100** and the second electronic device **10***a* receive the user's voice command ("next channel") and perform voice recognition. Each electronic device shares voice recognition results with the other electronic devices. For instance, in the embodiment described in connection with FIG. **12**, voice recognition results shared between the first electronic device **100** and the second electronic device **10***a* include gains of the received voice signals.

[0164] The controller **180** of the first electronic device **100** compares a first gain of a voice signal received by the first electronic device **100** with a second gain received from the second electronic device **10***a*, and selects one having a smaller gain as performing the voice commands (S**133**).

[0165] Since a distance d**1** between the second electronic device **10***a* and the user is shorter than a distance d**2** between the first electronic device **100** and the user, the first electronic device **100** may select the second electronic device **10***a* as an electronic device conducting the voice commands.

[0166] Accordingly, the controller **180** of the first electronic device **100** transfers a command allowing the second electronic device **10***a* to perform a function corresponding to the voice command ("next channel") to the second electronic device **10***a*. Then, in response to the above command, the second electronic device **10***a* changes the present channel to the next channel.

[0167] FIG. **13** is a flowchart illustrating an example of selecting an electronic device to perform voice commands according to an embodiment of the present disclosure. FIG. **14** illustrates an example where a voice command is performed by the electronic device selected in FIG. **13**.

[0168] Referring to FIGS. **13** and **14**, the controller **180** of the first electronic device **100** selects an electronic device for conducting voice commands based on voice recognition results received from other electronic devices connected thereto over a network.

[0169] According to an embodiment, the controller **180** selects an electronic device having a good voice recognition rate as a device for performing the voice command (S**1311**).

[0170] The "voice recognition rate" may refer to a current voice recognition rate or an average voice recognition rate for each device. Accordingly, when the average voice recognition rate is considered for the selection, an electronic device having a good average voice recognition rate may be chosen as the command performing device even though the current voice recognition rate of the electronic device is poor.

[0171] Each electronic device shares results of performing the voice recognition with other electronic devices. For instance, in the embodiment described in connection with FIG. **14**, results of performing voice recognition as shared between the first electronic device **100** and the second electronic device **10***a* include voice recognition rate data (or average voice recognition rate data) for each device.

[0172] The controller **180** of the first electronic device **100** compares an average recognition rate (95%) of the first electronic device **100** with an average recognition rate (70%) of the second electronic device **10***a* (S**1312**) and selects one having a larger value as the voice command performing device (S**1313**).

[0173] Accordingly, the controller **180** of the first electronic device **100** performs a command enabling a function corresponding to the voice command ("next channel") to be performed, so that a present channel is changed to its next channel.

[0174] FIG. **15** is a flowchart illustrating an example of selecting an electronic device to perform voice commands according to an embodiment of the present disclosure. FIG. **16** illustrates an example where a voice command is performed by the electronic device selected in FIG. **15**.

[0175] According to an embodiment, the controller **180** identifies an application in execution in each electronic device (S**1321**).

[0176] Then, the controller **180** identifies whether there is an electronic device executing an application corresponding to an input voice command among a plurality of electronic devices (S**1322**), and if any (yes in step S**1322**), the controller **180** of the first electronic device **100** selects the electronic device as a voice command performing device (S**1323**).

[0177] According to an embodiment, the method for controlling a mobile terminal may select an electronic device that may perform a user input voice command most efficiently in an environment involving a plurality of electronic devices to effectively conduct the voice command.

[0178] For instance, a voice command saying "transfer a picture to Chulsu" enables a predetermined picture to be transferred to an electronic device through emailing or MMS mailing. Accordingly, when there is any electronic device executing an application relating to messaging or emailing

among a plurality of electronic devices, it is most efficient for the corresponding electronic device to perform the voice command.

[0179] Referring to FIG. **16**, the second electronic device **10***a* is executing an email application, and the first electronic device **100** is executing a broadcast program. Under this circumstance, when the voice command saying "transfer a picture to Chulsu" is input to each of the electronic devices, the first electronic device **100** and the second electronic device **10***a* may exchange the programs (or contents) presently in execution to each other.

[0180] The first electronic device **100** determines that the second electronic device **10***a* may efficiently perform the newly input voice command through the program executed by the second electronic device **10***a*, and selects the second electronic device **10***a* as the voice command performing device.

[0181] Accordingly, the controller **180** of the first electronic device **100** may transfer a command to the second electronic device **10***a* to enable a function corresponding to the voice command ("transfer a picture to Chulsu") to be performed. In response to the command, the second electronic device **10***a* may perform the voice command.

[0182] FIG. **17** is a flowchart illustrating an example of selecting an electronic device to perform voice commands according to an embodiment of the present disclosure. FIG. **18** illustrates an example where a voice command is performed by the electronic device selected in FIG. **17**.

[0183] According to an embodiment, the controller **180** identifies remaining power for each electronic device (S**1331**), and selects an electronic device having more remaining power as the voice command performing device (S**1332**).

[0184] A predetermined amount of power may be consumed when a new voice command is performed in an environment involving a plurality of electronic devices. Accordingly, for example, an electronic device holding more power may be selected to perform the voice command.

[0185] Referring to FIG. **18**, the first electronic device **100** and the second electronic device **10***a* receive a voice command ("Naver") and perform voice recognition. Then, the first electronic device **100** and the second electronic device **10***a* share results of the voice recognition.

[0186] The shared voice recognition results include the amount of power remaining in each device. As it is identified that the first electronic device **100** has 90% remaining power, and the second electronic device **10***a* has 40% remaining power, the first electronic device **100** may perform a function (access to an Internet browser) corresponding to the voice command ("Naver").

[0187] A user may manually select the voice command performing device through power icons **33***a* and **33***b* displayed on the display unit to represent remaining power as well.

[0188] In the method for controlling an electronic device according to an embodiment, operations after a voice command has been performed by a specific electronic device are now be described.

[0189] Among a plurality of electronic devices, the first electronic device **100** may directly perform a voice command or may enable some other electronic device networked thereto to perform the voice command.

[0190] Operations of the first electronic device **100** after the first electronic device **100** performs the voice command are described with reference to FIGS. **19** and **20**, and operations of other electronic devices after the other electronic devices connected to the first electronic device **100** via a network perform the voice command are described with reference to FIGS. **21** and **22**.

[0191] FIG. **19** is a flowchart illustrating a method for controlling an electronic device according to an embodiment of the present disclosure. FIG. **20** is a view for describing the embodiment shown in FIG. **19**.

[0192] Referring to FIGS. **19** and **20**, the first electronic device **100** performs a voice command (S**201**).

[0193] When the voice command fails, the first electronic device **100** notifies a result of performing the voice command (i.e., failure) to the second electronic device **10***a* (S**202**).

[0194] Receiving the performance result, the second electronic device **10***a* determines whether there are other devices than the first electronic device **100** and the second electronic device **10***a* in the network. When it is determined that no other devices are present in the network, the first electronic device **100** may automatically perform the recognized voice command on its own.

[0195] Separately from the operation notifying the performance result, the first electronic device **100** may also transfer a command enabling the voice command to be performed to the second electronic device **10***a* (S**203**). In response, the second electronic device **10***a* performs the voice command (S**301**).

[0196] Referring to FIG. **20**, the first electronic device **100** sometimes fails to perform the input voice command ("Naver"-access to an Internet browser) for a predetermined reason (for example, due to an error in accessing a TV network).

[0197] In such a case, the first electronic device **100** may display a menu **51** indicating a failure in performing the voice command on the display unit **151**. The menu **51** includes an inquiry on whether to select another electronic device to perform the voice command.

[0198] While the menu **51** is provided, the controller **180** of the first electronic device **100** transfers a command enabling the second electronic device **10***a* to perform the voice command to the second electronic device **10***a* by a user's manipulation (selection of another device).

[0199] Hereinafter, operations after the voice command is performed by other electronic devices than the first electronic device **100** that is able to select the voice command performing device are described.

[0200] FIG. **21** is a flowchart illustrating a method for controlling an electronic device according to an embodiment of the present disclosure. FIG. **22** is a view for describing the embodiment shown in FIG. **21**.

[0201] Referring to FIG. **21**, the first electronic device **100**, the second electronic device **10***a*, and the third electronic device **10***c* each receive a user voice command and perform voice recognition (S**401**).

[0202] The second electronic device **10***a* transmits a voice recognition result to the first electronic device **100** (S**402**). The third electronic device **10***c* also transmits a voice recognition result to the first electronic device **100** (S**403**).

[0203] Based on the voice recognition results received from the second electronic device **10***a* and the third electronic device **10***c*, the controller **180** of the first electronic device **100** selects a voice command performing device (S**404**).

[0204] For purposes of illustration, the second electronic device **10***a* has a first priority value, the third electronic device

10*c* a second priority value, and the first electronic device **100** a third priority value in relation to an order in which the voice command is to be performed by the electronic devices.

[0205] The priority values may be determined based on the voice recognition results from the electronic devices. For example, the priority values may be assigned in an order of electronic devices satisfying better conditions to perform the input voice command among a plurality of electronic devices.

[0206] For example, at least one factor of the user-device distance, voice recognition rate, relevancy between the executing program and a program to be executed through the input voice command, and remaining power in each device may be considered to determine the order of the priority values.

[0207] However, the embodiments of the present disclosure are not limited to the above-listed factors. For example, when a predetermined voice input is received under the circumstance where one of the plurality of electronic devices does not execute a program and the other electronic devices execute their respective corresponding programs, whether to execute a program may be also taken into consideration to determine a priority value.

[0208] According to the determined priority values, the first electronic device **100** transfers a control command to the second electronic device **10***a* to perform the voice command (S**405**). In response to the control command, the second electronic device **10***a* may perform the voice command (S**406**).

[0209] Thereafter, the second electronic device **10***a* transmits a result of performing the voice command to the first electronic device **100** (S**407**).

[0210] When the voice command is not normally performed by the second electronic device **10***a* (No in step S**408**), the first electronic device **100** searches for an electronic device having the next highest priority value to reselect a voice command performing device (S**409**).

[0211] The first electronic device **100** selects the third electronic device **10***c* having the second highest priority value, and transfers a command to the third electronic device **10***c* to perform the voice command (S**410**).

[0212] In response, the third electronic device **10***c* performs the voice command (S**411**), and transfers a result to the first electronic device **100** (S**412**).

[0213] When the voice command is not normally performed by the third electronic device **10***c* (No in step S**413**), the first electronic device **100** searches for an electronic device having the next highest priority value to select a voice command performing device again.

[0214] Since the first, second, and third electronic devices are connected to one another over the network, the first electronic device **100** performs the voice command (S**414**).

[0215] Referring to FIG. **22**, when the tablet PC, mobile phone, and TV have the highest, second highest, and lowest priority values, respectively, with respect to performance of the voice command, the TV **100** first transfers a command for performing the voice command to the tablet PC **10***a*, and the tablet PC **10***a* then transfers a performance result to the TV **100** (See ①).

[0216] The TV **100** transfers the command for performing the voice command to the mobile phone **10***c*, which in turns conveys a performance result to the TV **100** (See ②).

[0217] When neither the tablet PC **10***a* nor the mobile phone **10***c* normally performs the voice command, the TV **100** may directly perform the voice command (See ③).

[0218] The method for controlling of the electronic device according to embodiments of the present disclosure may be recorded in a computer-readable recording medium as a program to be executed in the computer and provided. Further, the method for controlling a display device and the method for displaying an image of a display device according to embodiments of the present disclosure may be executed by software. When executed by software, the elements of the embodiments of the present disclosure are code segments executing a required operation. The program or the code segments may be stored in a processor-readable medium or may be transmitted by a data signal coupled with a carrier in a transmission medium or a communication network.

[0219] The computer-readable recording medium includes any kind of recording device storing data that can be read by a computer system. The computer-readable recording device includes a ROM, a RAM, a CD-ROM, a DVD±ROM, a DVD-RAM, a magnetic tape, a floppy disk, a hard disk, an optical data storage device, and the like. Also, codes which are distributed in computer devices connected by a network and can be read by a computer in a distributed manner are stored and executed in the computer-readable recording medium.

[0220] As the present disclosure may be embodied in several forms without departing from the characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

What is claimed is:

1. An electronic device comprising:

a communication unit configured to perform communication with at least a first electronic device included in a group of related electronic devices; and

a controller configured to:

identify, for each electronic device included in the group of related electronic devices, a voice recognition result of a voice command input provided by a user,

select, from among the group of related electronic devices, a voice command performing device based on the identified voice recognition results, and

control the voice command performing device to perform a function corresponding to the voice command input.

2. The electronic device of claim **1**, further comprising:

a voice input unit configured to input voice command inputs,

wherein the electronic device is included in the group of related electronic devices, and

wherein the controller is configured to recognize the voice command input provided by the user based on input received through the voice input unit.

3. The electronic device of claim **1**, wherein the controller is configured to:

identify, for each electronic device included in the group of related electronic devices, a voice recognition result that indicates whether or not recognition of the voice command input was successful at the corresponding electronic device, and

select, from among the group of related electronic devices, a voice command performing device based on the iden-

tified voice recognition results that indicate whether or not recognition of the voice command input was successful.

4. The electronic device of claim **1**:

wherein the voice command input provided by the user is a single voice command made by the user,

wherein multiple electronic devices included in the group of related electronic devices receive voice input based on the single voice command such that the single voice command results in multiple voice inputs to the group of related electronic devices, and

wherein the controller is configured to determine that the multiple voice inputs relate to the single voice command as opposed to multiple voice commands provided by the user.

5. The electronic device of claim **1**, wherein the controller is configured to:

select, from among the group of related electronic devices, multiple voice command performing devices based on the identified voice recognition results, and

control the multiple voice command performing devices to perform a function corresponding to the voice command input.

6. The electronic device of claim **5**, wherein the multiple voice command performing devices comprise the electronic device and the first electronic device.

7. The electronic device of claim **1**, wherein the controller is configured to select only one electronic device from the group of related electronic devices as the voice command performing device based on the identified voice recognition results.

8. The electronic device of claim **1**, wherein the controller is configured to:

identify, for each electronic device included in the group of related electronic devices, a distance from the user; and

select the voice command performing device based on the identified distances from the user.

9. The electronic device of claim **1**, wherein the controller is configured to:

identify, for each electronic device included in the group of related electronic devices, an average voice recognition rate; and

select the voice command performing device based on the identified average voice recognition rates.

10. The electronic device of claim **1**, wherein the controller is configured to:

identify, for each electronic device included in the group of related electronic devices, a type of application executing at a time of the voice command input provided by the user; and

select the voice command performing device based on the identified types of applications executing at the time of the voice command input provided by the user.

11. The electronic device of claim **1**, wherein the controller is configured to:

identify, for each electronic device included in the group of related electronic devices, an amount of battery power remaining; and

select the voice command performing device based on the identified amounts of battery power remaining.

12. The electronic device of claim **1**, wherein the controller is configured to perform a function corresponding to the voice command input and provide, to the first electronic device, feedback regarding a performance result for the function corresponding to the voice command.

13. The electronic device of claim **12**, wherein, when the function corresponding to the voice command input is performed abnormally, the controller is configured to select the first electronic device as the voice command performing device and control the first electronic device to perform the function corresponding to the voice command input.

14. The electronic device of claim **1**, wherein the communication unit is configured to communicate with the first electronic device through a Digital Living Network Alliance (DLNA) network.

15. A system comprising:

a first electronic device configured to receive a user's voice command; and

a second electronic device connected to the first electronic device via a network and configured to receive the user's voice command,

wherein at least one component of the system is configured to:

identify, for each of the first and second electronic devices, a voice recognition result for the user's voice command,

select at least one of the first electronic device and the second electronic device as a voice command performing device based on the identified voice recognition results, and

control the voice command performing device to perform a function corresponding to the user's voice command.

16. The system of claim **15**, wherein the at least one component of the system is configured to select one of the first electronic device and the second electronic device as the voice command performing device based on the voice recognition results.

17. The system of claim **15**, wherein the network includes a DLNA network.

18. A method for controlling an electronic device comprising:

identifying, for each electronic device included in a group of related electronic devices, a voice recognition result of a voice command input provided by a user;

selecting, from among the group of related electronic devices, a voice command performing device based on the identified voice recognition results; and

outputting a control signal that controls the voice command performing device to perform a function corresponding to the voice command input.

19. The method for claim **18**, wherein the group of related electronic devices communicate through a DLNA network.

20. The method of claim **18**, further comprising:

receiving, at an electronic device included in the group of related electronic devices, the voice command input provided by the user,

wherein the electronic device that received the voice command input provided by the user selects the voice command performing device and outputs the control signal.

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