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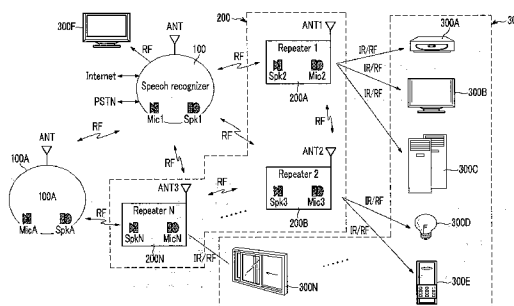
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(54) Title: HOME NETWORK SYSTEM AND CONTROL METHOD THEREOF

FIG. 1



(57) Abstract: The present invention connects a plurality of electronic/ electrical devices installed in various spaces in the home through a wireless network to build a home network, recognizes the control command of the electronic/ electrical device through speech recognition, and controls the operation of the corresponding electronic/ electrical device through wireless data communication. A home network system control device in a home network system for connecting one or more electronic/ electrical devices that are installed in respective spaces in a home through a network includes: a speech recognizer, installed in the home by a number of one or more, providing a speech recognition function and a remote controller function, recognizing a user's speech command, matching ID's of designated control target electronic/ electrical devices, and outputting control data through RF communication; and a repeater, connected to the electronic/ electrical device through a predetermined method, receiving the control data transmitted by the speech recognizer through RF communication, restoring the control data to parse ID's, determining whether it is a performance command for the repeater to perform an operation of the connected electronic/ electrical device, and transmitting a performance result of a control operation to the speech recognizer through RF communication. A home network is generated by connecting the speech recognizer and the repeater and connecting the repeater and the repeater through a radio data channel.

## HOME NETWORK SYSTEM AND CONTROL METHOD THEREOF

### Technical Field

The present invention relates to a home network system and control method thereof. In particular, it relates to a home network system and control method for connecting a plurality of electronic/electrical devices installed in various spaces in the home through a wireless network, recognizing a control command of the electronic/electrical device through speech recognition, and controlling an operation of the corresponding electronic/electrical device through wireless data communication.

### Background Art

As family incomes have increased, various electronic/electrical devices such as TVs, VCRs, audio systems, DVDs, satellite receivers, cable broadcasting receivers, lamp turn on/off devices, curtain shutters, window openers, gas valve opener, and gate openers have been installed in homes.

The various electronic/electrical devices are installed as wall pad types in new homes or when remodeling homes, are connected to a home server through a communication bus to thus configure a home network, and are remotely controlled by the Internet or the PSTN to thus provide convenience to a user.

The various electronic/electrical devices configuring the above-noted network generally provide a remote controller that is a wireless control device so that the operation control in the home is performed by manipulating a corresponding remote controller or by the user's direct manipulation.

However, the operation of electronic/electrical devices that are installed in other spaces that are unavailable to the remote controller signal manipulated by the user in the home cannot be controlled.

That is, in order to control specific electronic/electrical devices configured by the home network, it is required for the user to move to a space where the corresponding device is installed, and to perform the desired operation since the desired operation can only be controlled in the

space where the corresponding product is installed or a space that can receive a control signal of the remote controller.

Also, in order to control the operation of various electronic/electrical devices installed as a home network in the home, the user must locate the remote controller and perform the desired operation and hence the remote controller management is inconvenient, and a battery is used to thus generate an economic loss and environmental pollution.

Further, the control of the home network using the Internet or the PSTN causes substantial difficulty and inconvenience of manipulation since it is acquired by inputting a key signal for designating the desired electronic/electrical device according to a guidance message provided by the user.

Therefore, in order to provide more convenient home network usage to the user, various types of speech recognition methods have been applied to control the operation of the electronic/electrical device connected through the network and installed in the home according to speech input.

For example, when a designated command is stored in a control means and an input of the designated command is detected from recognition of an input speech command, an electronic/electrical device matching the command is found to control the corresponding operation.

However, when a plurality of devices for responding to the same device or the same command are provided in a space connected with a single network, the control command caused by speech recognition is simultaneously transmitted, and the devices are simultaneously operated.

For example, when televisions of the same model manufactured by the same manufacturer are installed in spaces such as a parlor and a living room connected with a single network and a control means performs a matched operation according to recognition of the speech command "turn on the television," televisions of the same model are simultaneously operated.

In order to prevent this drawback, a keyword is assigned to respective electronic/electrical devices to be controlled so as to prevent abnormal operation.

However, this method requires execution of more data than needed as the number of electronic/electrical devices connected to the network is increased and many speech commands are generated, and hence, the user must remember all the commands and thus it is difficult for the user to control the operation of the desired electronic/electrical device.

In addition, since the home network is installed in the new building networks, an additional communication line is installed or power line communication (PLC) is applied so as to form a network in the existing building.

However, installation of an additional communication line for network configuration in the building increases cost, trouble, and difficulty, and degrades the interior of the rooms because the communication line is exposed.

Further, in the case of using the PLC method, since noise of the power cable is input to the control signal, the operation of the target device is not stably controlled, and it is impossible to include data of various fields because of the legal regulations for the PLC, and hence reliable operation control is not provided, and a blanket area is generated in the RF based network, and therefore the method has restrictions in configuring the network.

The above information disclosed in this Background section is only for enhancement of understanding of the background of the invention and therefore it may contain information that does not form the prior art that is already known in this country to a person of ordinary skill in the art.

## **Detailed Description**

### **Technical Problem**

The present invention has been made in an effort to connect a plurality of electronic/electrical devices that are independently installed in various spaces in a home through a wireless network to configure a home network, and configuring the wireless network by connecting remote controllers for remotely controlling an operation of an electronic/electrical device and providing a speech recognition function.

Therefore, a control command of a specific electronic/electrical device is recognized through the user's speech recognition, the control command is transmitted to the electronic/electrical device through wireless data communication to operate the corresponding electronic/electrical device without spatial limitation, a dead zone of a network is eliminated by supplementing generation of a blanket area, and convenience to the user is provided by performing the same function in a single area or independently controlling the operation of electronic/electrical devices by using the same identifier (ID) of the same company and the same electronic/electrical device.

#### 10   **Technical Solution**

An exemplary embodiment of the present invention provides a home network system control device in a home network system for connecting one or more electronic/electrical devices that are installed in respective spaces in a home through a network including: a speech recognizer, installed in the home by the number of one or more, providing a speech recognition function and a remote controller function, recognizing a user's speech command, matching ID's of designated control target electronic/electrical devices, and outputting control data through RF communication; and a repeater, connected to the electronic/electrical device through a predetermined method, receiving the control data transmitted by the speech recognizer through RF communication, restoring control data to parse ID's, determining whether a performance command is given for the repeater to perform an operation of the connected electronic/electrical device, and transmitting a performance result of a control operation to the speech recognizer through RF communication.

Another embodiment of the present invention provides a home network system control method including: when a speech input is detected, a speech recognizer or a repeater recognizing and parsing an input to determine whether the speech includes a designated recognition word; when the speech includes no designated recognition word, deleting the recognition speech, and when the speech includes a designated recognition word, determining it as a speech command; parsing a speech command to extract

an ID of a control target electronic/electrical device, including a control command therein, and converting it into control data; transmitting the control data to a repeater connected to the target electronic/electrical device through RF communication; receiving the control data by the repeater  
5 through RF communication, parsing the ID included in the control data to determine whether the control data is a control command of the repeater, and controlling the electronic/electrical device to perform a corresponding operation when the control data is found to be a control command of the repeater; and when the operation is performed according to the control data  
10 received through RF communication, transmitting a corresponding result through an RF signal, and notifying the speech recognizer having transmitted the control data or the repeater.

#### **Brief Description of Drawings**

FIG. 1 shows a schematic diagram of a home network system  
15 according to an exemplary embodiment of the present invention.

FIG. 2 shows a detailed schematic diagram of a speech recognition control device shown in FIG. 1.

FIG. 3 shows a detailed schematic diagram of a repeater shown in FIG. 1.

20 FIG. 4 shows a detailed schematic diagram of a speech recognizing unit shown in FIG. 2.

FIG. 5 shows a flowchart of control execution by a home network system according to an exemplary embodiment of the present invention.

#### **Best Mode**

25 In the following detailed description, only certain exemplary embodiments of the present invention have been shown and described, simply by way of illustration.

As those skilled in the art would realize, the described embodiments may be modified in various different ways, all without departing from the spirit or scope of the present invention.  
30

Accordingly, the drawings and description are to be regarded as illustrative in nature and not restrictive. Like reference numerals designate like elements throughout the specification.

In addition, unless explicitly described to the contrary, the word "comprise" and variations such as "comprises" or "comprising" will be understood to imply the inclusion of stated elements but not the exclusion of any other elements.

5       A home network system control device and method according to an exemplary embodiment of the present invention will now be described with reference to accompanying drawings.

FIG. 1 shows a schematic diagram of a home network system according to an exemplary embodiment of the present invention.

10       As shown, the home network system includes a plurality of speech recognizers 100, a plurality of repeaters (200A-200N), and a plurality of electronic/electrical devices (300A-300N).

The speech recognizer 100 is a remote controller having a speech recognition function and an RF communication method, it is installed in a  
15       random space of a home by the number of one or more, it recognizes a user's speech command that is input through a microphone Mic1, matches an ID of an electronic/electrical device 300 designated to the speech command, and transmits it to a repeater 200 through radio data communication.

Also, the speech recognizer 100 is connected to the Internet and the  
20       PSTN, recognizes a speech command for controlling the electronic/electrical device 300 in the home provided through the Internet or the PSTN, matches an ID of the designated electronic/electrical devices 300, and transmits it to the repeater 200 through wireless data communication.

The speech recognizer 100 receives a result of operation performance  
25       from the repeater 200 through wireless data communication, demodulates the result, and outputs a demodulated signal as a guidance message through a speaker Spk1.

Wireless data communication between the speech recognizer 100 and the repeater 200 performs RF communication.

30       In addition, the wireless data communication includes various methods based on the design of hardware and software, including code division multiple access (wireless data communication), time division multiple access (TDMA), Bluetooth, amplitude modulation (AM), and frequency modulation (FM).

35       Also, at least one speech recognizer 100 is installed in the space

connected by a single network, and it forms a network according to a mutual RF method by applying an individual ID.

In one space, one speech recognizer 100 accesses another speech recognizer 100A, and the speech recognizer 100A that receives control data  
5 for controlling one electronic/electrical device 300 connected to the network through RF communication from the speech recognizer 100 transmits the control data received through the function of a repeater to the repeater 200 connected to the target electronic/electrical device 200 through RF communication.

10 That is, at least one speech recognizer 100 is installed in the space connected with a network to extend the communication radius, and the speech recognizer 100A can be utilized with the function of the repeater.

Also, the speech recognizer 100 recognizes the user's speech command and directly controls the operation of the electronic/electrical  
15 device installed in the same space without passing through the operation of the repeater 200.

For example, the speech recognizer 100 controls a television 300F installed in the installation space by recognition of a speech command through RF or IR communication without passing through the repeater 200.

20 The repeater 200 is connected to one or more of electronic/electrical devices 300 installed for each space in the home, receives wireless communication data from the speech recognizer 100, restores the data, compares the ID included in the received data and the registered ID of the repeater 200, and performs a corresponding operation according to a control  
25 command when the ID's correspond with each other.

Also, the repeater 200 transmits a result of the operation execution of the control command to the speech recognizer 100 through wireless data communication.

The repeater 200 is connected to the electronic/electrical device 300  
30 through IR and RF communication.

In addition, the connection between the repeater 200 and the electronic/electrical device 300 uses one of the PLC communication, the Bluetooth communication, the RF communication, and a communication bus, and the repeater 200 can be connected to each electronic/electrical device 300  
35 through tuning.



That is, when the electronic/electrical device 300 is newly installed or exchanged, the repeater 200 is installed in the electronic/electrical device 300 or the repeater 200 is mutually connected to the electronic/electrical device 300 by using one of the above-noted methods, by installing or connecting the  
5 repeater 200 including communication modules to each electronic/electrical device 300.

The repeater 200 further includes a learning function and an all purpose remote controller function, and an IR control code for the electronic/electrical device 300 in the home is stored by establishment or  
10 learning.

The speech recognizer 100 or the repeater 200 of the space in which the user executes the command advances the command system, and it outputs a speech message for indicating that the operation is executed to the speech recognizer 100 or the repeater 200 having commanded the execution  
15 result through speech after the execution of operation.

The repeaters 200 connected to the electronic/electrical devices 300 installed in various spaces of the home are available for mutual wireless communication, one of the repeaters 200 is set to be a master to allow mutual communication with reference to the repeater 200 set as a master and acquire  
20 a communication area, an identifier (ID) of another repeater 200 is registered to one repeater 200 that is near the blanket area so as to solve the blanket area on the network, and a tuned network with the concept of top and bottom is configured in the dependent format to acquire a wider communication area.

Mutual wireless communication between the repeaters 200 is  
25 desirably RF communication, and IR communication or Bluetooth is also possible.

Mutual wireless communication between the repeaters 200 will not be described since the communication method of the speech recognizer 100 and the repeater 200 is identically or similarly applied to the mutual wireless  
30 communication.

The repeater 200 includes a plurality of radio channels, and transmits/receives a control signal and data through a channel while transmitting/receiving speech data as a control command through another channel.

35 The electronic/electrical device 300 includes a VCR, an audio system,

a satellite receiver, a cable broadcasting receiver, a curtain shutter, a gas valve opener, and a gate opener including a DVD 300A, a TV 300B, an air conditioner 300C, a lamp 300D, a refrigerator 300E, and a window opener 300N.

5           FIG. 2 shows a detailed schematic diagram of a speech recognition control device shown in FIG. 1.

          As shown, the speech recognizer 100 includes a power supply 110, a speech recognizing unit 120, a controller 130, a memory 140, a radio transceiver 150, a key matrix 160, a PSTN access unit 170, and an Internet  
10       access unit 180.

          The power supply 110 converts the voltage that is supplied through an inserted battery, commercial voltage, or an adaptor into voltages V1 and V2 that are required for respective load elements configuring the speech recognizer 100.

15           The speech recognizing unit 120 is connected to a microphone Mic1 and a speaker Spk1, recognizes the user's speech command input by the microphone Mic1 to provide the speech command to the controller 130, and modulates a response to the operation execution result provided by the controller 130 to output the response to the speaker Spk1.

20           The controller 130 determines the speech command to be normal when a recognition word of "SB" exists in the parsed speech command, and it clears the recognized speech command when no recognition word exists.

          The controller 130 parses the speech command input by the user to extract the electronic/electrical device 300 of the control target, matches it  
25       with the ID of the electronic/electrical device 300, controls wireless data communication, and transmits a matched result to the repeater 200.

          Also, when "SB" that is the recognition word of the speech command exists and an ID for designating the electronic/electrical device 300 of the control target is not detected, the controller 130 determines it to be a  
30       command for controlling an electronic/electrical device (e.g. a television 300F in FIG. 1) installed in the same space, and directly controls the corresponding television 300F through the RF or IR method without passing through the repeating of the repeater 200.

          The controller 130 parses the speech command that is remotely input  
35       through the PSTN access unit 170 or the Internet access unit 180 to extract the

electronic/electrical device 300 of the control target, matches it with the ID of the electronic/electrical device 300, controls wireless data communication, and transmits a matched result to the repeater 200.

Also, the controller 130 provides the control result provided by the  
5 repeater 200 to the speech recognizing unit 120 to output it as speech guidance through the speaker Spk1.

The memory 140 stores a table for matching a "keyword" and an "electronic/electrical device designation word" of the speech command recognized by the controller 130 with ID's, and a table including an  
10 "operation command" and converting it into data.

The radio transceiver 150 transmits the data for controlling the electronic/electrical device 300 having an ID matched with the operation command and ID applied by the controller 130 to the repeater 200 connected to the target electronic/electrical device 300 through wireless data  
15 communication, receives an operation result from the repeater 200, and provides it to the controller 130.

The radio transceiver 150 transmits/receives a wireless data signal through an RF signal or an IR signal.

The above description is also applicable to other wireless  
20 communication methods.

The key matrix 160 includes various function buttons for establishing an ID of the repeater 200 connected to the electronic/electrical device 300 established or exchanged according to the entire operation setting and tuning concept of the speech recognizer 100.

FIG. 3 shows a detailed schematic diagram of a repeater shown in  
25 FIG. 1.

As shown, the repeater 200 includes a power supply 210, a radio transceiver 220, a controller 230, a memory 240, a codec 250, an IR converter 260, and an IR transmitter 270.

30 The power supply 210 converts the voltage that is supplied through an inserted battery, a commercial voltage, or an adaptor into voltages V21 and V22 that are required for respective load elements configuring the repeater 200.

The radio transceiver 220 is connected to the speech recognizer 100  
35 through the RF signal to receive a control command from the

electronic/electrical device 300 and demodulate the same, and transmits a control result of the electronic/electrical device 300 to the speech recognizer 100.

5 The radio transceiver 220 further accesses one of the neighboring repeaters through an RF signal to repeat the RF signal of the speech recognizer 100.

The controller 230 extracts an ID included in the data that are received through the radio transceiver 220 to determine whether the ID matches an ID established to the controller 230, and applies a control  
10 command of the electronic/electrical device 300 included in the data to the IR converter 260.

The controller 230 provides data received through the radio transceiver 220 to the codec 250 when the data include a speech message.

15 The memory 240 stores an IR control code for controlling the connected electronic/electrical device 300, a proper ID of the repeater 200, and data required for operating the controller 230.

The codec 250 demodulates the speech message provided by the controller 230 to output a guidance message to the speaker Spk2, and modulates the user's control command input by the microphone Mic2 to  
20 provide the modulated signal to the controller 230.

By inputting the speech command through the microphone Mic2 connected to the codec 250, the electronic/electrical device 300 is controlled or the network is connected, and the electronic/electrical device 300 installed in another space can be controlled.

25 The IR converter 260 converts the control command of the electronic/electrical device 300 into an IR control code according to control by the controller 230 to transmit the IR control code to the electronic/electrical device 300 of the control target through the IR transmitter 270.

30 FIG. 4 shows a detailed schematic diagram of a speech recognizing unit shown in FIG. 2.

As shown, the speech recognizing unit 100 includes an oscillator 121 for oscillating a predetermined frequency for recognizing the speech command, desirably at the frequency of 29.4912MHz, a DSP 122 that is a  
35 processor for recognizing the speech command, a codec 123 for modulating

the speech command input by the microphone Mic1 into a digital signal and demodulating a response to operation execution into speech, a memory 124 for storing information for execution of speech recognition of the DSP 124, a display 125 for displaying recognition of the speech command and an execution result, a JTAG 126 for providing a repeating interface of the recognized speech command, and an amplifier 127 for amplifying the speech demodulated by the codec 123 by a predetermined level and outputting an amplified signal through the speaker Spk1.

An operation for controlling an electronic/electrical device by receiving a speech command in a system for generating a home network by connecting a speech recognizer having a remote controller function and a repeater and connecting a repeater and another repeater through a wireless network will now be described.

When the user generates a speech command "SB, turn on the television in the living room," in the space in which the speech recognizer 100 is installed during the standby mode or while one operation is being operated, the microphone Mic1 of speech directivity applies the speech command to the speech recognizing unit 120.

Therefore, the DSP 122 in the speech recognizing unit 120 recognizes the speech command that is modulated into a digital signal by the codec 123 according to the frequency of the oscillator 121, and applies the speech command recognized by the JTAG 126, an interface, to the controller 130.

The controller 130 parses the applied speech command to determine, for example, whether there is a recognition word "SB", determines it to be a normal speech command when there is a recognition word, and it clears the recognized speech command when there is no recognition word.

When there is a recognition word and the speech command is determined to be a normal speech command, the controller 130 parses the speech command, and extracts a location designated keyword, such as "living room," a command for indicating the control target electronic/electrical device 300B such as a "television", and a control command such as "turn on".

The controller 130 extracts an ID matched with a keyword and a control target device from a table stored in the memory 140, matches it, includes a control command, and provides RF transmit data to the radio

transceiver 150.

Therefore, the radio transceiver 150 modulates the control command matched with the ID of the electronic/electrical device 300B of the control target into an RF signal according to control by the controller 130, and  
5 transmits the RF signal to the repeater 200.

In this instance, the radio transceiver 220 in the repeater 200 connected to the electronic/electrical device 300 installed in the home through IR communication or RF communication receives the RF signal from the speech recognizer 100 to restore the same, and provides the received data  
10 to the controller 230.

The controller 230 parses the received data to extract an ID for indicating a control target device, and compares the extracted ID and the ID of the controller 230 to determine whether they are matched with each other.

When the ID's are not matched with each other according to the ID  
15 comparison result, the received data are discarded, and when the ID's are matched, the received control data are provided to the IR converter 260.

Therefore, the IR converter 260 converts the control data into an IR signal, and transmits the IR signal to the electronic/electrical device 300 of the control target through the IR transmitter 270 to perform a corresponding  
20 operation input as a speech command.

That is, the repeater 1 200A to the repeater N 200N receive the RF signal from the speech recognizer 100, and the repeater 2 200B to the repeater N 200N compare the ID included in the received RF signal and the ID's of the repeaters, and discard the received RF signal since the ID's are not matched.

However, the repeater 1 200A outputs an IR control code to turn on  
25 the television 300B since the ID included in the received RF signal and the ID of the repeater 1 are matched with each other.

When the television 300B that is a control target is turned on through speech command recognition and wireless network communication, the  
30 repeater 1 200A modulates a result of operation execution into an RF signal, and transmits the RF signal.

Therefore, the radio transceiver 150 in the speech recognizer 100 receives and demodulates the RF signal transmitted by the repeater 1 200A, and provides resultant data to the controller 130.

35 The controller 130 provides the received data transmitted by the

radio transceiver 150 to the speech recognizing unit 120 to demodulate them into speech data, and notifies the user of the fact that the television instructed by the speech command and in the living room is normally turned on through the speaker Spk1.

5           Also, as shown in FIG. 1, when more than one of the same devices such as a television 300B and a television 300F are installed in the space connected through one network, the user can conventionally operate the desired television by assigning a location command for designating a "parlor" or a "living room."

10           In this case, since unneeded space commands such as "turn on the television in the living room" or "turn on the light in the parlor" in one open space, usage is confused, speech command data for the respective spaces are to be installed repeatedly, and hence, the memory capacity is to be increased and a loss of managing data is generated.

15           However, in the embodiment of the present invention, when the user orders the speech recognizer 100 to "turn on the television" in the above-noted open space (parlor), the television 300F provided in the parlor is turned on and the television 300B controlled by the repeater 200A is not operated even though it is the same product as the television 300F.

20           Since the television 300F installed in the parlor is operable by the direct control of the speech recognizer 100, the command of "turn on the television" is a signal for requesting direct control of the speech recognizer 100 and it does not include an ID for designating the repeater 200A.

          Therefore, the repeater 200A having an independent ID does not  
25   recognize the command "turn on the television" as a command for the repeater 200A, and hence, a plurality of the same products of the same company installed in the different space are not operated.

          However, since the speech command "SB, turn on the television" that is input after including a recognition word is a normal command, the  
30   controller 130 determines the command such that the speech recognizer 100 directly controls one of electronic/electrical devices installed in the same space as that in which the speech recognizer 100 is installed.

          Therefore, the controller 130 outputs a control code for controlling a target electronic/electrical device (e.g., the television 300F) by using the RF  
35   signal or the IR signal through the radio transceiver 150 to perform an

operation of the recognized control command.

By applying this process, it is possible to independently control the desired electronic/electrical device when a plurality of the same products of the same company are installed in the respective spaces.

5       The method for independently controlling the electronic/electrical device 300 connected to the repeater 200 through IR and RF communication by using the RF communication between one or more speech recognizers 100 and repeaters 200 installed in the home has been described.

10       However, when a speech command for remotely controlling the electronic/electrical device 300 connected to the repeater 200 is input to the controller 130 installed in the speech recognizer 100 through the PSTN access unit 170 or the Internet access unit 180, the speech recognizer 100 transmits the speech command to the repeater 200 through the RF signal according to a like or similar operation that is described above.

15       Also, since the wireless network is formed by the IR or RF communication between the repeaters 200, a case for controlling the electronic/electrical device 300N connected to the repeater N 200N by inputting a speech command by a repeater 200, for example, a repeater 1 200A, will now be described.

20       When a speech command, for example "SB, open the window of the room opposite the living room," is input through a microphone Mic2 installed in the repeater1 200A, the codec 250 installed in the repeater 1 200A recognizes the speech command and applies it to the controller 230.

25       In this instance, the controller 230 parses the applied speech command to determine whether there is a recognition word "SB" for example, it is determined to be a normal speech command when there is a recognition word, and the recognized speech command is cleared when there is a recognition word.

30       When the recognition word exists and it is determined to be a normal speech command, the speech command is parsed to extract a location designating keyword such as a "room opposite the living room," a command for indicating a control target electronic/electrical device such as a "window," and a control command such as a "open", and hence the entire command "open the window of the room opposite the living room" is  
35       extracted.



An ID matched with the keyword and the control target device is extracted from the table stored in the memory 240 to match it and include a control command, and RF transmit data are provided to the radio transceiver 220.

5 Therefore, the radio transceiver 220 modulates the control command matched with the ID of the electronic/electrical device 300N of the control target into an RF signal according to control by the controller 230, and transmits the RF signal.

10 In this instance, since the ID included in the transmitted RF signal and the ID of the repeater N 200N are matched with each other, the electronic/electrical device 300N as a control target is controlled by the same or similar operation to perform the corresponding operation input as a speech command.

15 Also, the repeater N 200N transmits an operation performance result to the repeater 1 200A to notify the user that the window of the room opposite the living room instructed by the speech command is normally opened through the speaker Spk2.

20 Since the RF communication channel between the speech recognizer and respective repeaters and between the repeater and the repeater is connected with a plurality of devices, RF communication using another channel is normally performed to provide quick response and accuracy of the control command when a new speech command is detected while mutual data communication is progressed.

25 FIG. 5 shows a flowchart of control execution by a home network system according to an exemplary embodiment of the present invention.

An operation referring to FIG. 5 will be described with reference to the operation in which the speech recognizer 100 detects a speech command and transmits it to the repeater 200 through an RF signal.

30 When the speech recognizer 100 detects an input of speech (S102) while operation standby or a random operation is performed S101, the speech recognizer 100 recognizes it (S103), parses the format configuring the input speech (S104), and determines whether it includes a recognition word for distinguishing the speech command, for example "SB" (S105).

35 When the recognition word for distinguishing the speech command is not included in S105, the recognized speech is deleted to return to S101

(S106), and when the recognition word is included, it is determined to be inputting of a normal speech command (S107).

The speech recognizer 100 parses the input speech command (S108) to extract the electronic/electrical device that is a control target and match a  
5 corresponding ID (S109), and modulates it with an RF signal to transmit the RF signal to the repeater 200 (S110).

The repeaters 200 forming a wireless network in the space in the home receives the RF signal from the speech recognizer 100 to demodulate it (S111), and compares the ID included in the RF signal and the ID of the  
10 repeater 200 (S112) to determine whether the ID's are matched with each other (S113).

When the ID's are not matched with each other according to the determination of S113, the RF signal is deleted (S114), and when the ID's are matched, the command of the received RF signal is parsed to extract the  
15 electronic/electrical device 300 of the control target (S115).

The extracted control command is modulated with the IR signal to transmit it to the electronic/electrical device 300 and control the operation (S116).

When the operation of the electronic/electrical device 300 is  
20 controlled according to inputting of the speech command, the repeater 200 modulates finish information that is a result of operation performance with an RF signal, and provides the information to the speech recognizer 100 (S117).

Therefore, the speech recognizer 100 restores operation finish  
25 information provided by the repeater 200 into speech and outputs it through a speaker to notify the user of the fact that the operation of the corresponding electronic/electrical device 300 instructed with a speech command is normally performed (S118).

Also, an operation for a random repeater to recognize a speech  
30 command input by the user, and control the corresponding electronic/electrical device through communication between the repeaters forming a wireless network is performed in a like or similar manner of the described operation, and hence it will not be described.

The above-described embodiments can be realized through a  
35 program for realizing functions corresponding to the configuration of the

embodiments or a recording medium for recording the program in addition to through the above-described device and/or method, which is easily realized by a person skilled in the art.

While this invention has been described in connection with what is  
5 presently considered to be practical exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

10 The present invention configures a speech recognizer having a remote controller function, a repeater, and a wireless network between repeaters to generate a home network system for various electronic/electrical devices installed in the home and controls them through wireless data communication, thereby providing convenience.

15 Also, as at least one RF channel is applied, stability and reliability are provided to wireless data communication, and when there is a plurality of the same electronic/electrical devices (televisions, air conditioners, curtains, cold/hot air supplies, and windows) of a same company, the devices can be conveniently and independently controlled, since the user can control the  
20 desired devices in the desired space without selecting an additional space, usage convenience is provided.

Also, the blanket area in the network is reduced, and the user can configure the network by selecting the desired space since the space in which the user performs a command is a tuned home network system that is the  
25 central area of the home network, thereby reducing the cost and increasing the usage convenience.

Further, usage convenience and efficiency are provided according to speech recognition-based wireless home network control.

## WHAT IS CALIMED IS

1. A home network system control device in a home network system for connecting one or more electronic/electrical devices that are  
5 installed in respective spaces in a home through a network, the home network system control device comprising:

a speech recognizer, installed in the home by a number of one or more, providing a speech recognition function and a remote controller function, recognizing a user's speech command, matching ID's of designated  
10 control target electronic/electrical devices, and outputting control data through RF communication; and

a repeater, connected to the electronic/electrical device through a predetermined method, receiving the control data transmitted by the speech recognizer through RF communication, restoring the control data to parse  
15 ID's, determining whether it is a performance command for the repeater to perform an operation of a connected electronic/electrical device, and transmitting a performance result of a control operation to the speech recognizer through RF communication.

20 2. The home network system control device of claim 1, wherein the speech recognizer recognizes the user's speech command to directly control an operation of the electronic/electrical device installed in the same space without undergoing repeating of the repeater.

25 3. The home network system control device of claim 1, wherein the speech recognizer transmits/receives control data to/from at least one different speech recognizer installed in the same space or another space by applying an ID, and the other speech recognizer receiving control data functions as a repeater.

30 4. The home network system control device of claim 1, wherein the speech recognizer is connected to the Internet and the PSTN to recognize the speech command provided through the Internet or the PSTN, matches the ID's of the designated electronic/electrical devices, and outputs  
35 the control data to the repeater through RF communication.

5. The home network system control device of claim 1, wherein  
the speech recognizer receives a result of operation performance from  
the repeater through RF communication, demodulates it, and outputs a  
5 modulated result as a guidance message through a speaker.

6. The home network system control device of claim 1, wherein  
the speech recognizer connects a repeater and a radio channel by  
applying one communication method of the RF, CDMA, TDMA, Bluetooth,  
10 AM, and FM methods.

7. The home network system control device of claim 1, wherein  
the speech recognizer recognizes the recognized speech as a speech  
command when the recognized speech has a designated recognition word.  
15

8. The home network system control device of claim 1, wherein  
the speech recognizer includes:  
a power supply for supplying a voltage to respective load elements;  
a speech recognizing unit for recognizing the user's speech command  
20 input through a microphone, providing the speech command to a controller,  
demodulating a received operation performance result, and outputting the  
result through a speaker;

a controller for determining whether the recognized speech includes  
a designated recognition word to recognize a speech command, extracting a  
25 control target electronic/electrical device from the speech command to  
match an ID, controlling RF communication to transmit to the repeater, and  
providing a control result provided by the repeater to the speech recognizing  
unit to output the control result as speech guidance;

a memory for storing a table for matching a "keyword" and an  
30 "electronic/electrical device designation word" of a speech command  
recognized by the controller with ID's and a table including an "operation  
command" and converting it into control data;

a radio transceiver for transmitting control data having an ID  
matched with the operation command applied by the controller to the  
35 repeater through RF communication, receiving an operation result from the

repeater, and providing the operation result to the controller; and  
a key matrix for establishing an entire operation of the speech recognizer and an ID of the tuned electronic/electrical device.

5           9.       The home network system control device of claim 1, wherein  
the speech recognizer includes a plurality of radio channels, and  
transmits/receives control data and operation results through one channel  
while transmitting other control data through another channel.

10          10.       The home network system control device of claim 1, wherein  
the repeater accesses the electronic/electrical device by using one of  
the IR communication, PLC communication, Bluetooth communication, RF  
communication, and a communication bus.

15          11.       The home network system control device of claim 1, wherein  
the repeater further includes a learning function and an all purpose  
remote controller function, and stores an IR or RF control code for the  
connected electronic/electrical device by establishment or learning.

20          12.       The home network system control device of claim 1, wherein  
the repeater performs mutual RF communication with another  
neighboring repeater having an independent ID, and sets a repeater as a  
master to acquire a wider communication area.

25          13.       The home network system control device of claim 1, wherein  
the repeater includes a plurality of radio channels, and  
transmits/receives a control signal and data through one channel while  
transmitting speech data that is a control command through another channel.

30          14.       The home network system control device of claim 1, wherein  
the repeater includes:  
a power supply for supplying a voltage to respective load elements  
configuring the repeater;  
a radio transceiver for accessing the speech recognizer through RF  
35 communication, and transmitting/receiving control data and operation

results;

a controller for comparing the ID included in the control data received through the radio transceiver and the ID of the controller, and applying control data to an IR converter when the ID's are matched with each other;

a memory for storing an IR control code for controlling the electronic/electrical device, a proper ID of the repeater, and data for operation performance of the controller;

a codec for modulating speech input by a microphone, demodulating speech data received through RF communication, and outputting speech through a speaker; and

an IR converter for converting a control command of the electronic/electrical device into an IR control code according to control by the controller, and transmitting the IR control code to the corresponding electronic/electrical device.

15. The home network system control device of claim 8, wherein the speech recognizing unit includes:

an oscillator for oscillating a predetermined frequency for recognizing the speech command;

a DSP that is a processor for recognizing the speech command;

a codec for modulating the speech command input by a microphone into a digital signal, and demodulating a response to operation performance into speech;

a memory for storing information for speech recognition of the DSP;

a display for displaying recognition of the speech command and a corresponding performance result;

a JTAG for interfacing the recognized speech command; and

an amplifier for amplifying the speech demodulated by the codec by a predetermined level, and outputting it through a speaker.

16. A home network system control device comprising:

a speech recognizer for recognizing a user's speech; and

a repeater connected to an electronic/electrical device installed in the home, wherein

the speech recognizer and the repeater respectively have a remote controller function and a proper ID for recognizing the user, and a home network is generated by connecting the speech recognizer and the repeater and connecting the repeater and the repeater through a wireless network,  
5 and

independent control is provided to at least one same product installed within a communication radius of radio data.

17. The home network system control device of claim 16, wherein  
10 the speech recognizer and the repeater register the repeater, which is expanded when it is required to expand the home network area, in the tuning format to configure it as a network and expand the home network system.

18. The home network system control device of claim 16, wherein  
15 the speech recognizer and the repeater include a command performer, and independently control a plurality of the same electronic/electrical devices configured into a single network by using a proper ID.

19. The home network system control device of claim 16, wherein,  
20 in the speech recognizer and the network system space, the speech recognizer or the repeater in the space for performing the user's command is recognized as a main master, and operation performance guidance is output by the main master.

20. A home network system control method comprising:  
25 when speech input is detected, a speech recognizer or a repeater recognizing and parsing the inputting to determine whether the speech includes a designated recognition word;

30 when the speech includes no designated recognition word, deleting the recognition speech, and when the speech includes a designated recognition word, determining it as a speech command;

parsing a speech command to extract an ID of a control target electronic/electrical device, including a control command therein, and  
35 converting it into control data;



transmitting the control data to a repeater connected to the target electronic/electrical device through RF communication;

the repeater, receiving the control data through RF communication, parsing the ID included in the control data to determine whether the control data is a control command of the repeater, and controlling the electronic/electrical device to perform a corresponding operation when the control data is found to be a control command of the repeater; and

when the operation is performed according to the control data received through RF communication, transmitting a corresponding result through an RF signal, and notifying the speech recognizer having transmitted the control data or the repeater.

21. The home network system control method of claim 20, wherein

the speech recognizer or the repeater includes at least one radio channel, and occupies a channel in the standby mode and transmits/receives control command data when an input of a speech command is detected while using another channel.

FIG. 1

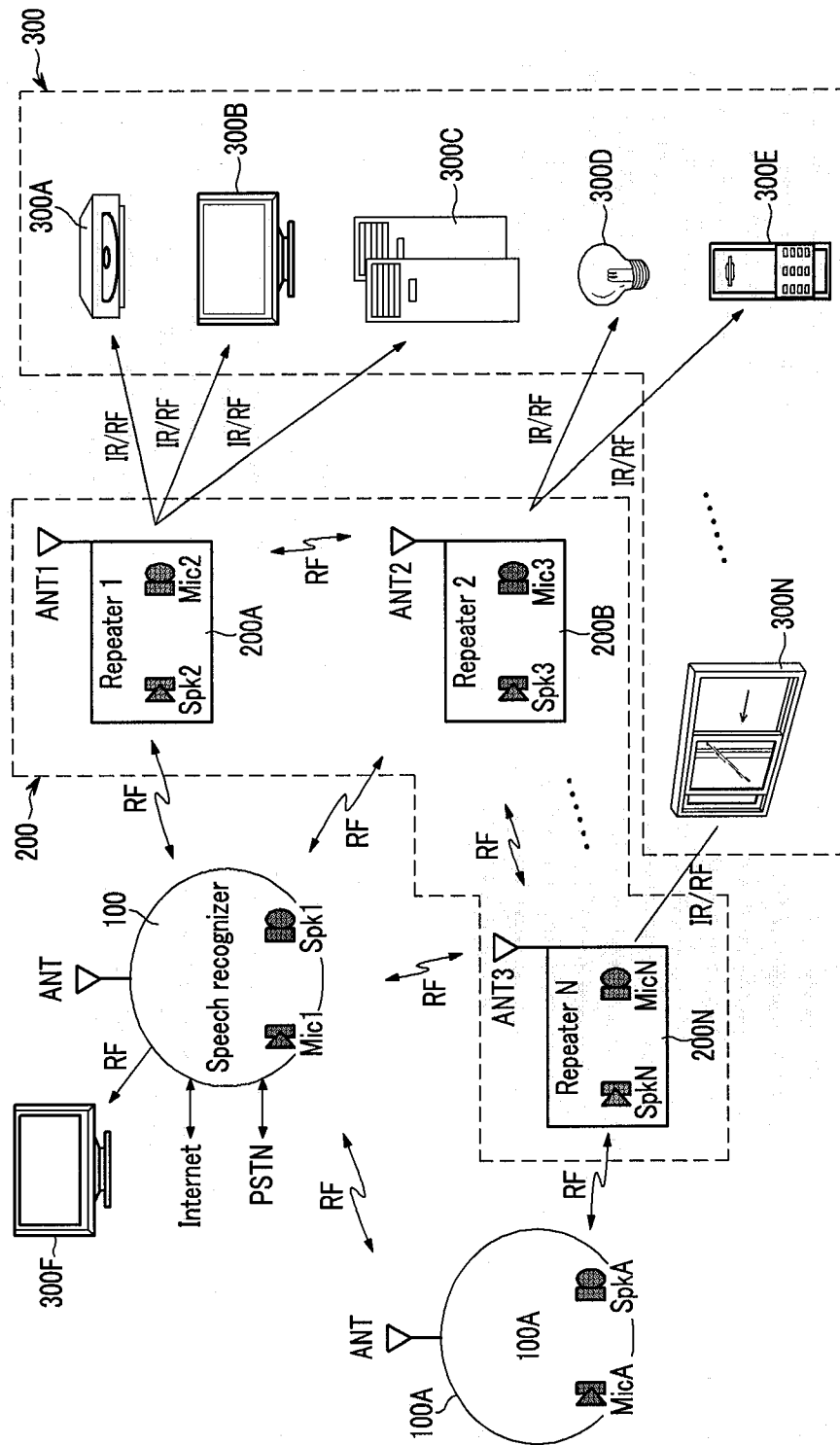


FIG. 2

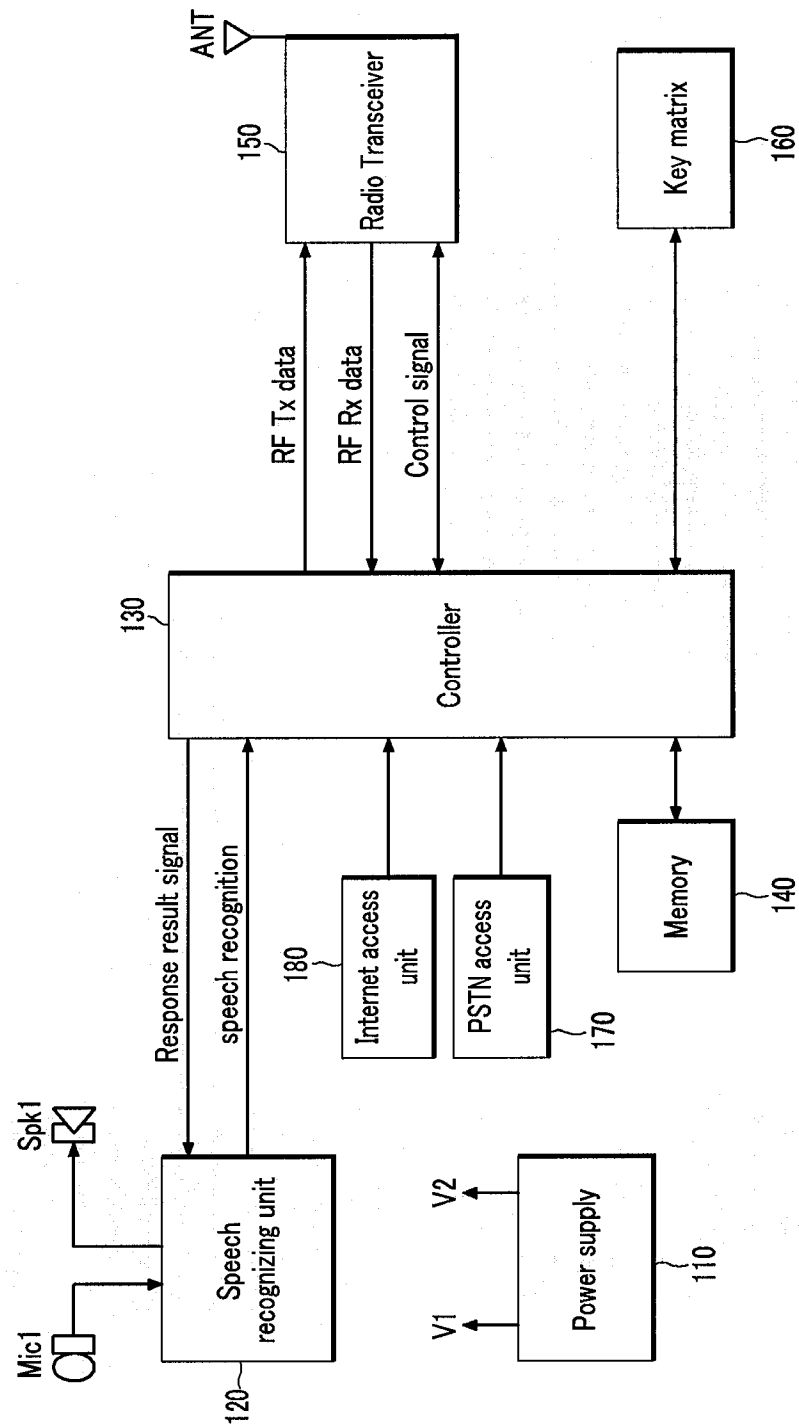


FIG. 3

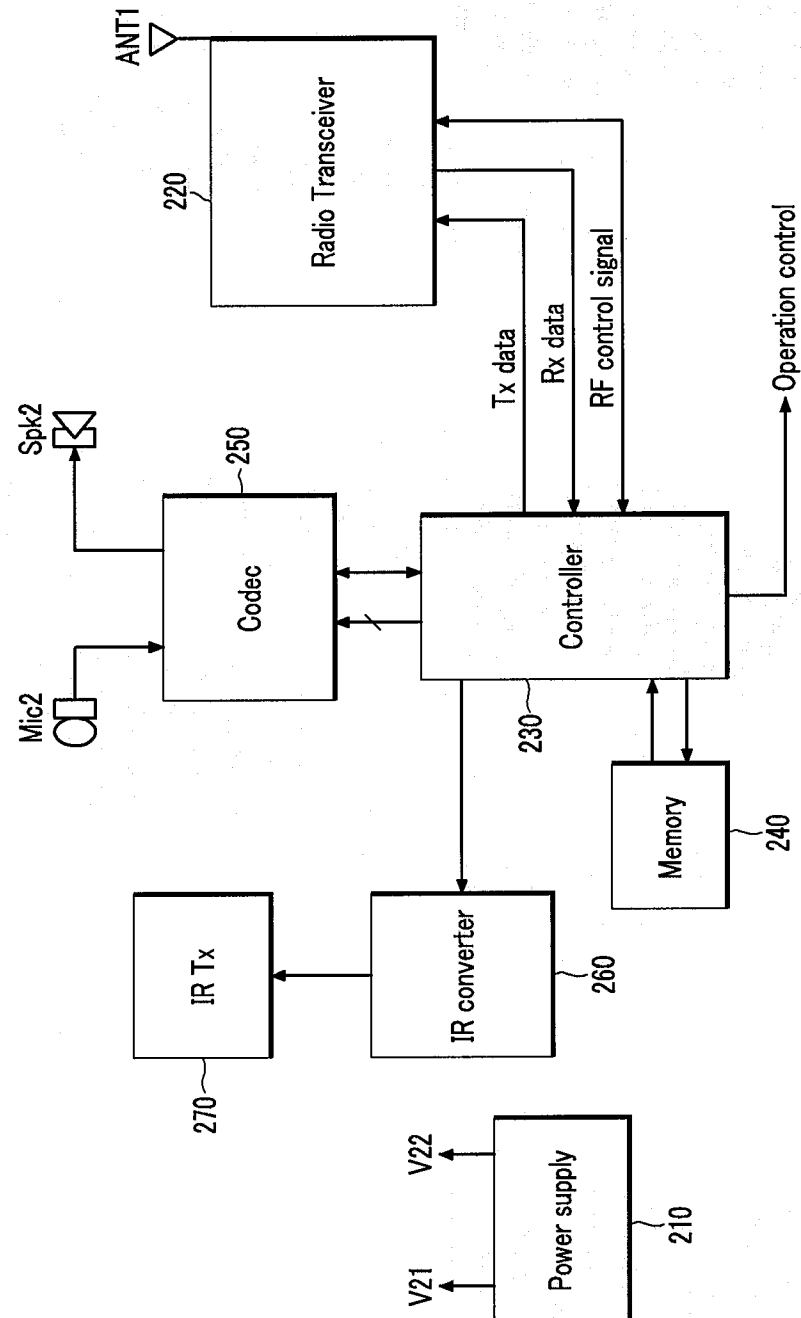


FIG. 4

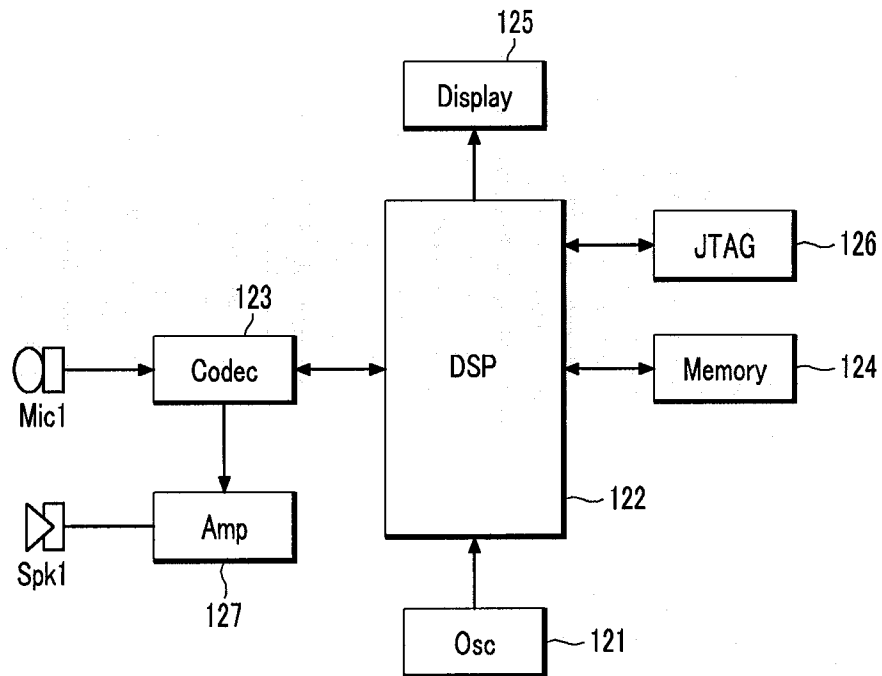
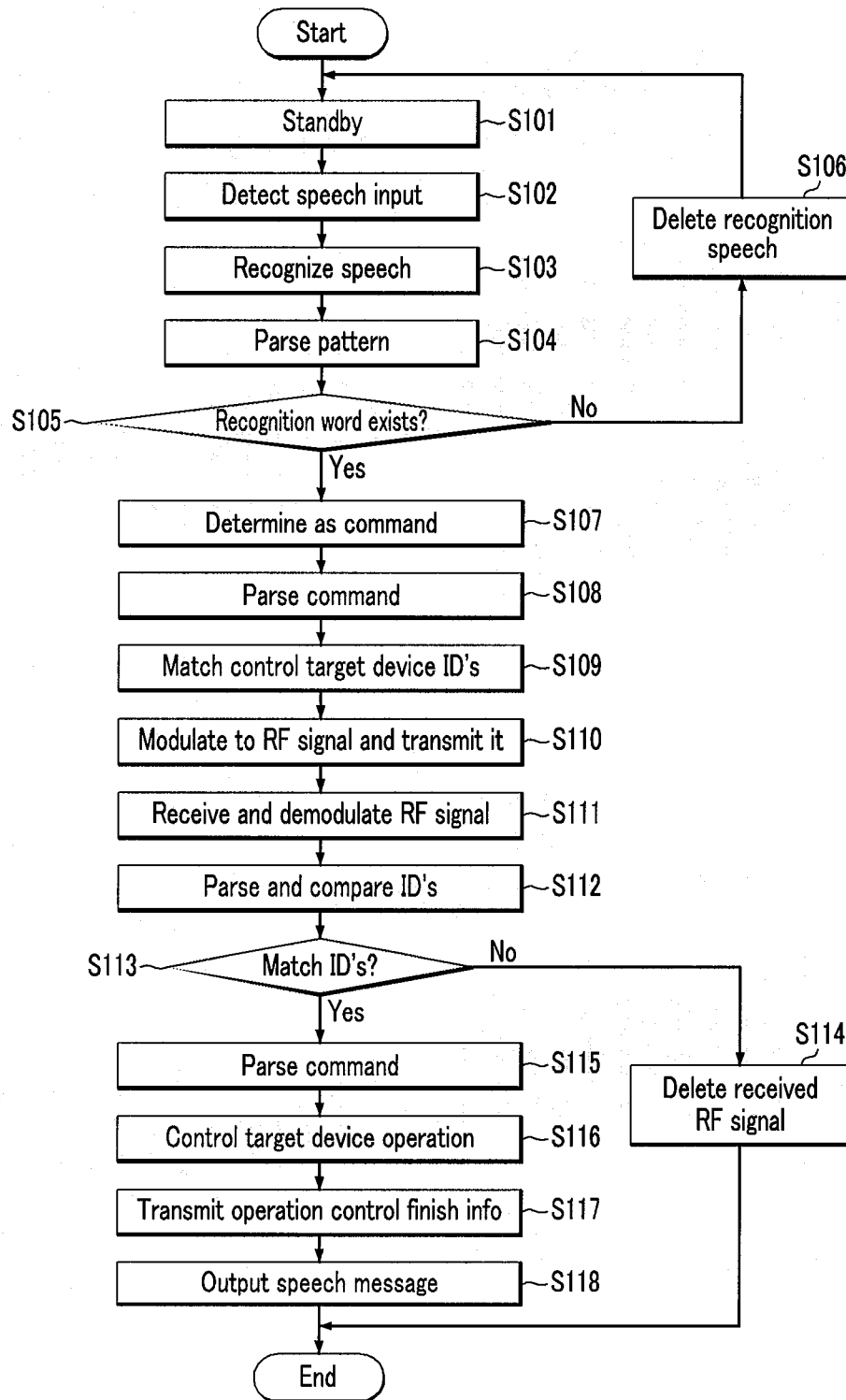


FIG. 5



## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/KR2008/000473****A. CLASSIFICATION OF SUBJECT MATTER****H04L 12/16(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 : H04L 12/16; H04Q 9/00; G10L 21/00; G06F 15/173, 17/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
Korean Utility models and applications for Utility models since 1975Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
WPI, eKIPASS(KIPO internal)**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2003-0071975 A (SL2) 13 September 2003 See abstract; figures 1-5; claims 1-5.	1,2,5,6,8,10,11,20
A	US 20040093219 A1 (HO-CHUL SHIN et al.) 13 May 2004 See abstract; figures 1, 3; claims 1-4, 7.	1, 20
A	US 6961763 B1 (YI-MIN WANG et al.) 1 November 2005 See abstract; figure 3; column 7 line 62-column 8 line 24.	1, 20
A	US 20060004743 A1 (HIROYA MURAO et al.) 5 January 2006 See abstract; figures 1, 2; claims 5, 10-12.	1, 20



Further documents are listed in the continuation of Box C.



See patent family annex.

\* Special categories of cited documents:

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

13 MAY 2008 (13.05.2008)

Date of mailing of the international search report

**13 MAY 2008 (13.05.2008)**

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/KR2008/000473**

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US2006004743A1	05.01.2006	None	