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(54) COMMAND AND CONTROL OF DEVICES AND APPLICATIONS BY VOICE USING A COMMUNICATION BASE SYSTEM

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(57) **ABSTRACT**

A first communication path for receiving a communication is established. The communication includes speech, which is processed. A speech pattern is identified as including a voice-command. A portion of the speech pattern is determined as including the voice-command. That portion of the speech pattern is separated from the speech pattern and compared with a second speech pattern. If the two speech patterns match or resemble each other, the portion of the speech pattern is accepted as the voice-command. An operation corresponding to the voice-command is determined and performed. The operation may perform an operation on a remote device, forward the voice-command to a remote device, or notify a user. The operation may create a second communication path that may allow a headset to join in a communication between another headset and a communication device, several headsets to communicate with each other, or a headset to communicate with several communication devices.

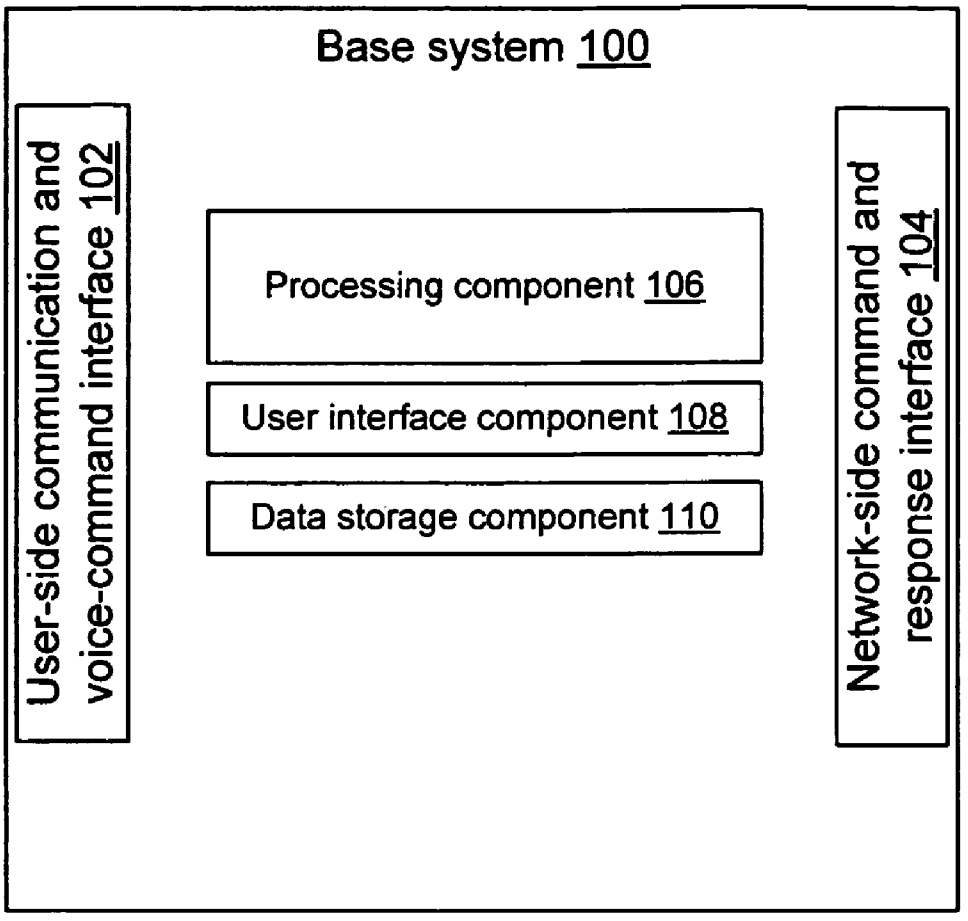


FIGURE 1

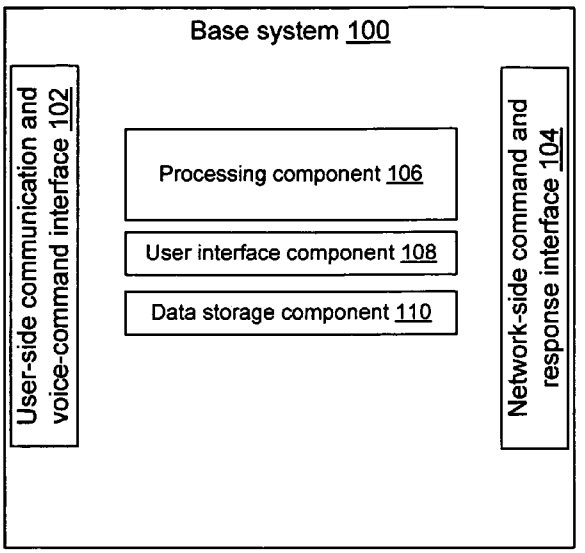


FIGURE 2

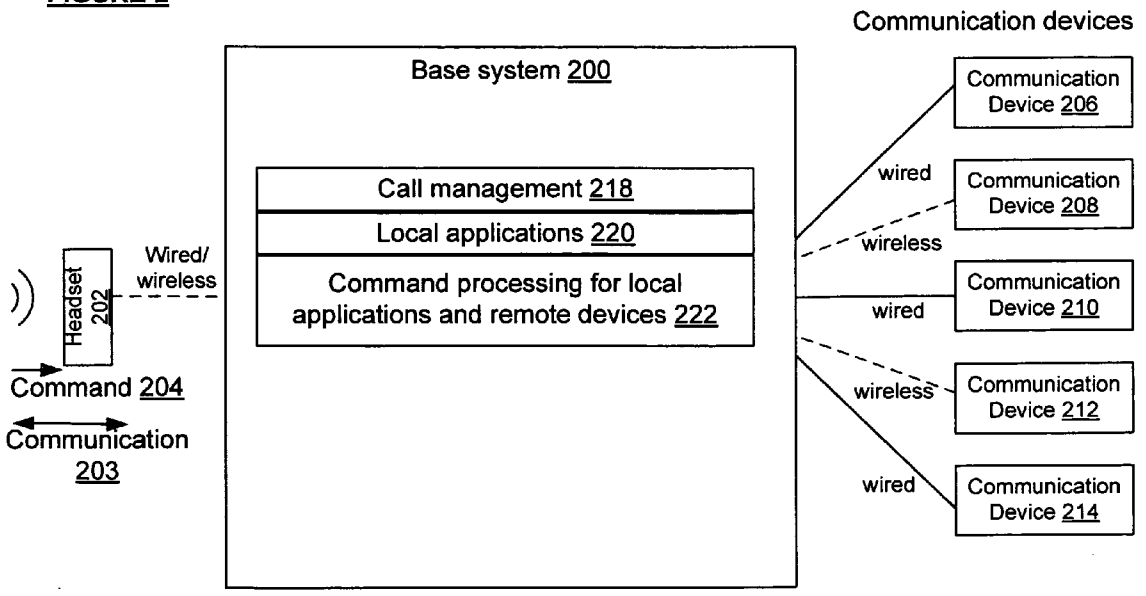


FIGURE 3

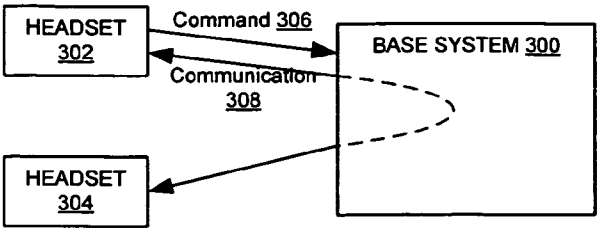
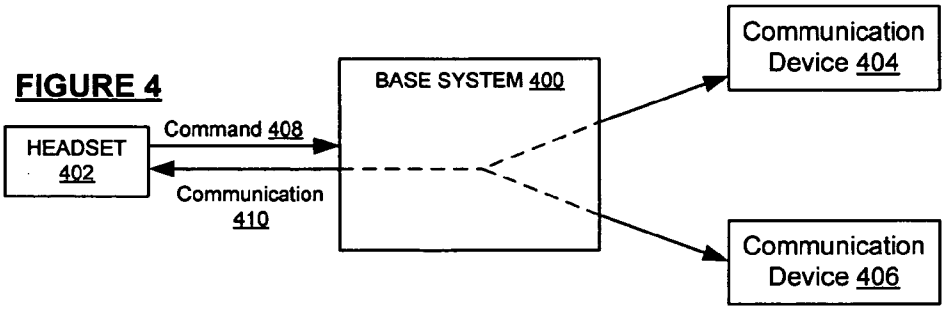


FIGURE 4



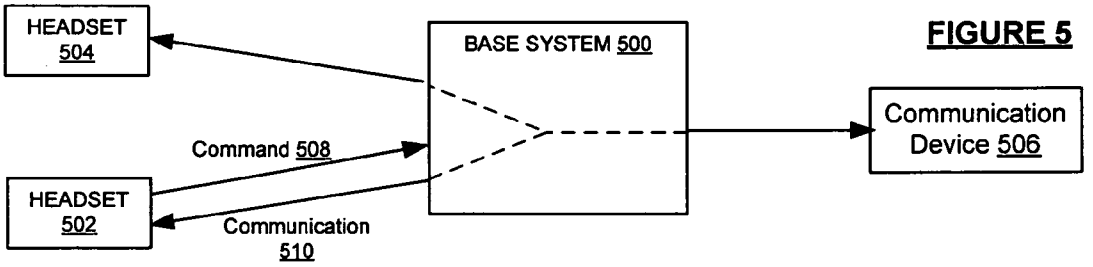


FIGURE 5

FIGURE 6

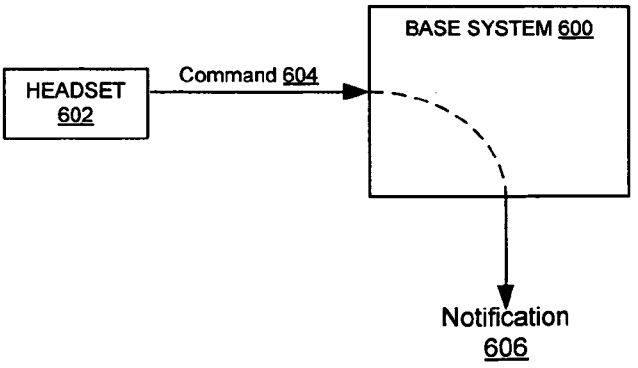
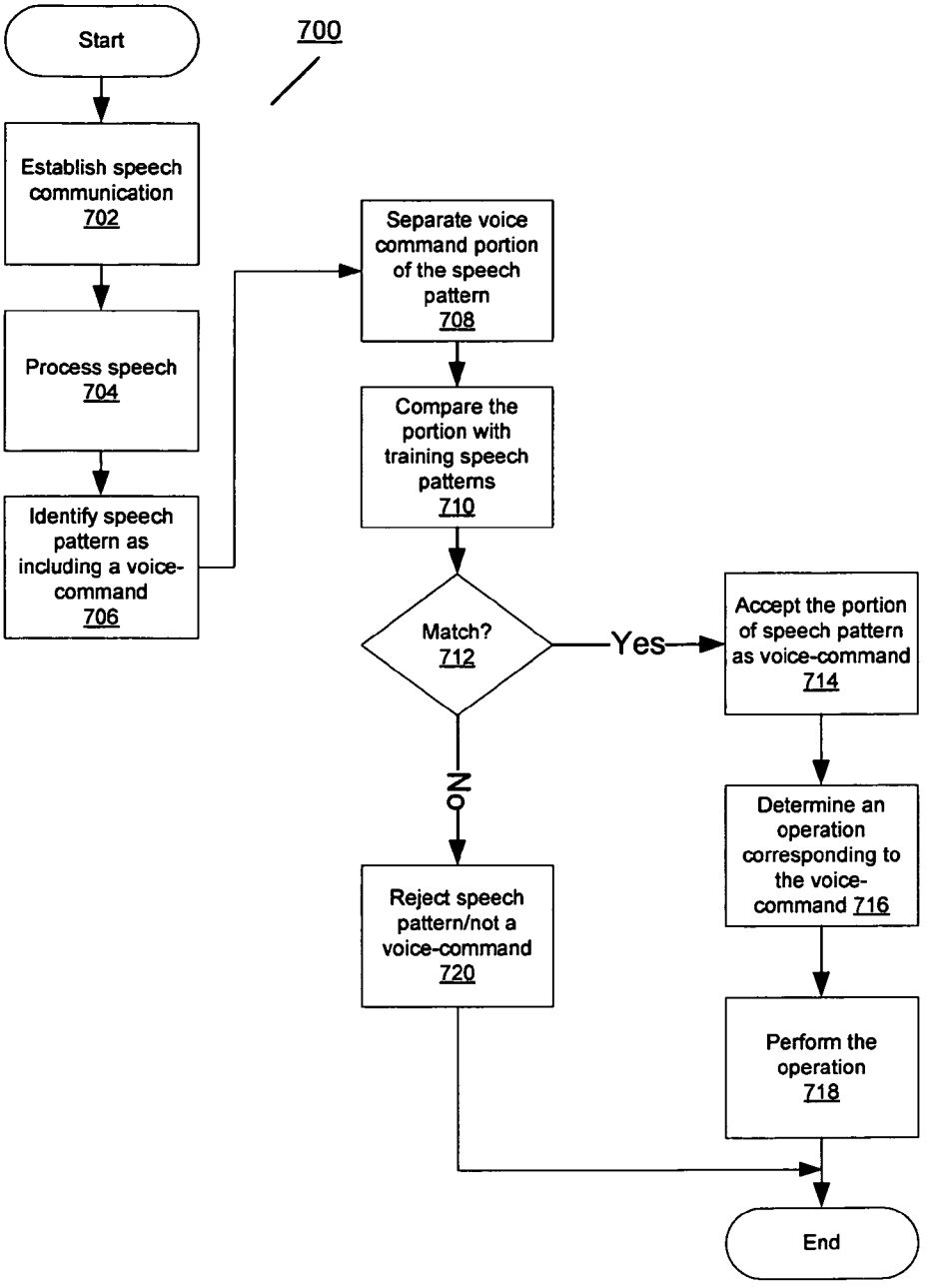


FIGURE 7


700
Start
Establish speech communication 702
Process speech 704
Identify speech pattern as including a voice-command 706
Separate voice command portion of the speech pattern 708
Compare the portion with training speech patterns 710
Match? 712
Yes
No
Accept the portion of speech pattern as voice-command 714
Determine an operation corresponding to the voice-command 716
Perform the operation 718
Reject speech pattern/not a voice-command 720
End

COMMAND AND CONTROL OF DEVICES AND APPLICATIONS BY VOICE USING A COMMUNICATION BASE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This Application claims priority from the following co-pending U.S. Provisional Patent Application No. 61/003,519 filed on Nov. 16, 2007.

BACKGROUND

[0002] 1. Field of the Invention

[0003] The principles of the present invention relate generally to an improved communication system, and in particular, to an improved system and method for interaction with several systems and telecommunication devices. Still more particularly, the principles of the present invention relate to a communication base system and method for command and control of devices and applications by voice using the communication base system.

[0004] 2. Description of the Related Art

[0005] A communication device is a device that may place or receive a telecommunication. The term "communication devices" refers to the collection of all devices usable for telecommunication. For example, a communication device can be the familiar telephone, a computer with a telecommunication enabling software application, which are commonly known as softphones, a telephone-like device that works over data networks instead of a plain old telephone system (POTS) line, a wireless or cellular phone, or any other device used for telecommunication. A communication device is any one of these communication devices. Communication devices may also include devices and applications capable of communicating in other ways, for example, by text messaging, instant messaging including text, audio, video, images, and documents. Communication devices may further include radio transceivers embedded in appliances, computers, as well as automobiles.

[0006] Presently, wearable devices are available that a user can use for interacting with a variety of systems and devices. Some examples of such wearable devices are wired and wireless headsets that include at least a speaker and a microphone. A user may connect these headsets to a device using wires or a wireless protocol, such as Bluetooth, in order to interact with that device. The user can wear the headset and engage in voice telecommunication when the headset is connected with a communication device. The user may also couple the headset with a computer and engage in a voice over Internet Protocol (VOIP) telecommunication using a softphone software application.

[0007] As some more examples, a user may use a headset to interact with a gaming console, such as Xbox® manufactured by Microsoft® Corporation, or PlayStation® manufactured by Sony® Corporation. A user may use a headset for dictating a document to speech-to-text software. Wearable headsets integrating a microphone and a speaker are presently used for a variety of activities with a variety of devices.

[0008] However, headsets and other devices for similar purposes are presently able to interact with one system or device at a time. The interaction with one device may be over a wired or wireless connection. In one example, when using a Bluetooth headset with a first device, such as a landline phone, the user has to disassociate (e.g., disconnect) the headset from a second device, such as a mobile phone, and associate the headset with the first device. Of course, the headset would need to be pre-registered with each device before associating the headset with either device.

SUMMARY

[0009] In order to enable several devices, such as headsets, to communicate with several communication devices over a range of types of networks simultaneously, the illustrative embodiments provide a method, computer usable program product, and system for command and control of devices and applications by voice using a communication base system. A first communication path for receiving a communication is established. The communication includes speech. The speech is processed. A speech pattern is identified as including a voice-command. A portion of the speech pattern is determined as including the voice-command. That portion of the speech pattern is separated from the speech pattern and compared with a second speech pattern. If the two speech patterns match or resemble each other, the portion of the speech pattern is accepted as the voice-command. An operation corresponding to the voice-command is determined and performed.

[0010] The voice-command may be received during the communication as a part of the speech. Performing the operation may be performing the operation on a remote device or establishing a second communication path between a first device that sends the voice-command and second device.

[0011] The second communication path may allow a headset to join in a communication between another headset and a communication device, a plurality of headsets to communicate with each other, a headset to communicate with a plurality of communication devices, or any combination thereof. The operation may also forward the voice-command to a remote device or notify a user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The novel features believed characteristic of the illustrative embodiments are set forth in the appended claims. The illustrative embodiments, however, as well as a preferred mode of use, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

[0013] FIG. **1** depicts a block diagram of components of a base system in accordance with an illustrative embodiment;

[0014] FIG. **2** depicts a block diagram of application components of a base system in accordance with an illustrative embodiment;

[0015] FIG. **3** depicts a block diagram of a first type of command processing in a base system in accordance with an illustrative embodiment;

[0016] FIG. **4** depicts a block diagram of a second type of command processing in a base system in accordance with an illustrative embodiment;

[0017] FIG. **5** depicts a block diagram of a third type of command processing in a base system in accordance with an illustrative embodiment;

[0018] FIG. **6** depicts a block diagram of a fourth type of command processing in a base system in accordance with an illustrative embodiment; and

[0019] FIG. **7** depicts a flowchart of a process of processing voice-commands in accordance with an illustrative embodiment.

DETAILED DESCRIPTION OF THE DRAWINGS

[0020] A communication base system, or simply a "base system", as described in the co-pending U.S. application Ser. No. 11/985,766 (Attorney docket number 024777.0406PTUS), entitled Communication Base System and Method of Using the Same, filed on Nov. 16, 2007 and which is incorporated herein in its entirety by reference, may be used for voice-commands using the headsets. A voice-command, or a verbal command, is a command or instruction given to a system using voice or speech.

[0021] Illustrative embodiments recognize that a user would like to be able to use a single headset for communicating with more than one device without having to engage in a process of disassociating the headset from a previous device, and associating the headset with a new device. The illustrative embodiments further recognize that several users, each with a variation of a headset, may wish to communicate with a common communication device. A user with a headset may wish to engage in communication with one or more other users with headsets, one or more communication devices, or any combination thereof, using a communication base system. The user may wish to engage in such communication by having the communication base system perform the desired functions through voice-commands.

[0022] Therefore, a system that is capable of processing voice-commands for allowing one or more headsets to communicate with one or more other headsets and communication devices without the user having to perform an association and disassociation of the headset with each device may be useful Such a system may be further useful by processing voice-commands for performing other actions on applications running locally on the system or remotely on communication devices. The illustrative embodiments describe such a system and methods of using that system.

[0023] Wired or wireless headsets are just some examples of wearable devices that users use for communication purposes. Any devices facilitate a user's communication with a computer or another device in a manner similar to that of a headset. For example, a desk-microphone and a desk-speaker may facilitate a user's communication with a computer in a manner similar to the wearable headset. For the clarity of the description below, the illustrative embodiments are described with respect to a headset. However, the headsets are not limiting on the illustrative embodiments, and a particular implementation may use any other device that may communicate with communication devices, such as a headset, may communicate with those communication devices.

[0024] With reference to FIG. **1**, this figure depicts a block diagram of components of a base system in accordance with an illustrative embodiment. Base system **100** may include user-side communication and voice-command interface **102** (interface **102**). Interface **102** may be a software component, a hardware component, or a combination thereof. Interface **102** may enable communication between base system **100** and one or more headsets that a user may use for voice communications as well as issuing voice-commands.

[0025] Base system **100** may further include network-side command and response interface **104** (interface **104**). Interface **104** may also be a software component, a hardware component, or a combination thereof. Interface **104** may enable communication between base system **100** and one or more communication devices. A user interfacing with base system **100** using interface **102** may be able to send voice-commands to a communication device interfacing with base system **100** via interface **104**. Furthermore, base system **100** may communicate a command, whether in the form of a voice-command, a software invocation, a hardware interrupt, or any other suitable form, to communication devices using interface **104**.

[0026] Base system **100** may further include processing component **106**. Processing component **106** may be a digital signal processing (**0**SP) component, or any other type of processing component that is capable of processing voice-commands. User interface component **108** may allow a user to program, configure, access, or otherwise manipulate base system **100**. Data storage component **110** may store information used in communications between headsets and communication devices that base system **100** may establish. For example, data storage component **110** may store information pertaining to configuration and operation of base system **100**, interface parameters of various headsets and communication devices, instructions for processing a set of voice-commands, and any other information that maybe used in a particular implementation of base system **100**.

[0027] With reference to FIG. **2**, this figure depicts a block diagram of application components of a base system in accordance with an illustrative embodiment. Base system **200** may be similar to base system **100** in FIG. **1**. Base system **200** may communicate with headset **202** as well as any number of other headsets. Headset **202** may engage in voice communication **203** using base system **200**, or issue voice-command **204**, which may be directed to base system **200** or a communication device, such as any of communication devices **206**, **208**, **210**, **212**, and **214**.

[0028] Call management component **218** may facilitate voice communication between a headset and a communication device, such as between headset **204** and communication device **206** via base system **200**. Local applications **220** may be one or more applications executing on base system **200**. For example, a recording application executing on base system **200** may be a local application in local applications **220**. Some other examples of local applications **220** may be logging, screening, displaying, reporting, notifying, configuring, updating, and managing applications.

[0029] Command processing **222** may be a processing engine for processing voice-commands, such as voice-command **204**. Command processing **222** executing on base system **200** may be able to understand voice-commands. A user, using headset **202** or another device capable of receiving the user's voice, may speak a voice-command, such as voice-command **204**, that base system **200** may be able to recognize by processing the voice-command using command processing **220**. The user may speak only the voice-command, speak the voice-command with ambient sounds, or speak the voice-command during a conversation with another party when the conversation is occurring through the base system. The base system may receive the voice-command as a speech pattern and apply processing, such as digital signal processing, to the speech to recognize that the speech includes a voice-command.

[0030] The base system maybe trained to recognize a set of voice-commands from a set of users in those users' voices. A set of voice-commands is one or more voice-commands. A set of users is one or more users. For example, one or more users

may submit their speech patterns for the same or different voice-commands. The users may correlate those voice-commands at the base system with specific operations they want the base system to execute when they speak one of those voice-commands. For example, a user may train the base system to recognize the address word "Base" followed by a command, such as "connect with cell phone." Another user may train the base system to recognize just the command "connect to my cell phone". Both users may then correlate their respective commands to the operation of connecting their respective headsets with their respective cell phones. Many other commands and formats of commands are conceivable based on the principles described in this disclosure. For example, a user may configure a phrase in a language other than English, a pneumonic, or a noun as a voice-command for a specific operation.

[0031] In an alternative embodiment, rather than or in addition to the voice-commands, a dual-tone multi-frequency (DTMF) recognition engine may operate to recognize and respond to DTMF signals to perform certain functions. For example, pressing the number "1" key on a headset or another device that may include a keypad may send a DTMF signal to the base system to perform a function. Similarly, pressing the number "2" key may send a DTAF signal to the base system for performing a different function. For example, pressing "1" may cause the base unit to connect a call; pressing "2" may cause the base unit to disconnect a call.

[0032] With reference to FIG. **3**, this figure depicts a block diagram of a first type of command processing in a base system in accordance with an illustrative embodiment. Base system **300** may be similar to base system **200** in FIG. **2**. Headset **302** and **304** may each be a headset similar to headset **202** in FIG. **2**, or a comparable device capable of sending and receiving voice communications.

[0033] A user of headset **302** may be able to interact verbally with a user of headset **304** via base system **300**. For example, headset **302** may accept voice-command **306** from the first user that may instruct base system **300** to establish communication path **308** between headset **302** and headset **304**. Note that headset **302**, headset **304**, or both headsets maybe engaged in communications with other communication devices at the time of voice-command **306**. For example, the first user may be using the headset **302** for a telephone conversation with a party. The second user using headset **304** may be engaged in a voice interactive game on a gaming console. The first user may issue voice-command **306** during the telephone conversation, such as "base . . . connect with John". The base system may establish communication between the first user and "John," the second user, such that neither the party that the first user is conversing with, nor the gaming console that John may be interacting with, receives any signals corresponding to the conversation between the first user and John that follows voice-command **306**. That conversation may occur on communication path **308** established as a result of voice-command **306**. The first user may speak another voice-command to terminate the sidebar conversation with John and resume normal conversation with the party.

[0034] With reference to FIG. **4**, this figure depicts a block diagram of a second type of command processing in a base system in accordance with an illustrative embodiment. Base system **400** may be similar to base system **300** in FIG. **3**. Headset **402** may be a headset similar to headset **202** in FIG. **2**, or a comparable device capable of sending and receiving voice communications. Communication device **404** and **406** may each be a communication device similar to any of communication devices **206-214** in FIG. **2**.

[0035] A user of headset **402** may be able to issue voice-commands to the communication base system. For example, a user may be able to instruct base system **400** using voice-command **408** to connect the user's headset with communication device **404**, which may be the user's cell phone, as well as communication device **406**, which maybe the user's desk phone. Base system **400** may then establish communication path **410** so the user may be able to switch between the two conversations on those two communication devices. As another example of using the illustrative embodiment in this figure, the user may instruct base system **400** using voice-command **408** to connect headset **402** to the user's mobile phone as well as the user's computer. Base system **400** may then establish communication path **410** so that the user may interact with a VOIP application on the computer as well as have a voice conversation on the user's mobile phone. As another example, the user may be able to use voice-command **408** to cause base system **400** to perform certain base system operations, such as by using local applications **220** in FIG. **2**. Examples of base system operations may be increasing the volume of a call, placing a call on hold, squelching the noise on a call, or any other function a particular base system maybe able to support

[0036] With reference to FIG. **5**, this figure depicts a block diagram of a third type of command processing in a base system in accordance with an illustrative embodiment. Base system **500** may be similar to base system **400** in FIG. **4**. Headset **502** and **504** may each be a headset similar to headset **202** in FIG. **2**, or a comparable device capable of sending and receiving voice communications. Communication device **506** may be a communication device similar to any of communication devices **206-214** in FIG. **2**.

[0037] A user of headset **502** may be able to issue voice-commands to base system **500**. For example, a user may be able to instruct base system **500** using voice-command **508** to connect headset **502** into a conversation that headset **504** may be having using communication device **506**, which may be the user's cell phone. Base system **500** may then establish communication path **510** so the users of headset **502** and **504** may both be able to jointly communicate with communication device **506**.

[0038] A user of headset **502** may also be able to issue voice-command **508** to communication device **506** accessible through base system **500**. For example, a user may be able to instruct base system **500** using voice-command **508** to pass-through the subsequent voice commands. An example of such a voice-command process may include a user speaking, "Base . . . pass to mobile phone," followed by "phonebook" Base system **500** would then pass the speech pattern of the user saying "phonebook" to communication device **506**, the user's mobile phone, which may also be trained to recognize some voice-commands. Upon receiving the "phonebook" voice-command, the mobile phone may display the list of contacts stored on the mobile phone to the user. As another example, the user may speak, "Base . . . pass to computer," followed by "launch Word," prompting the user's computer to launch the Microsoft™ Word® application.

[0039] A user of a headset may also be able to issue voice-commands to the base system and have the base system invoke a corresponding operation on the base system, one or more communication devices, or any combination thereof.

between headsets, linking multiple headsets to a common call, and connecting several calls to a headset for switching. The illustrative embodiments may be implemented according to the above description for providing voice-command interface to communication devices and applications on communication devices that may otherwise not be voice-command enabled.

[0053] The illustrative embodiments can take the form of an entirely hardware embodiment, an entirely software embodiment or an embodiment containing both hardware and software elements. Furthermore, the illustrative embodiments can take the form of a computer program product accessible from a computer-usable or computer-readable medium providing program code for use by or in connection with a computer or any instruction execution system. For the purposes of this description, a computer-usable or computer-readable medium can be any tangible apparatus that can contain, store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device.

[0054] The medium can be an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system (or apparatus or device) or a propagation medium. Examples of a computer-readable medium include a semiconductor or solid-state memory, magnetic tape, a removable computer diskette, a random access memory (RAM), a read-only memory (ROM), a rigid magnetic disk and an optical disk. Current examples of optical disks include compact disk-read only memory (CD-ROM, compact disk-read/write (CD-R/W) and DVD.

[0055] Further, a computer storage medium may contain or store a computer-readable program code such that when the computer-readable program code is executed on a computer, the execution of this computer-readable program code causes the computer to transmit another computer-readable program code over a communication link This communication link may use a medium that is, for example without limitation, physical or wireless.

[0056] The above description has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the illustrative embodiments in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art.

What is claimed:

1. A method for controlling devices and applications using voice-commands, the method comprising:
- establishing a first communication path for receiving a communication, the communication including speech;
- processing the speech;
- identifying a speech pattern as including a voice-command;
- determining a portion of the speech pattern as including the voice-command;
- separating the portion of the speech pattern from the speech pattern;
- comparing the portion of the speech pattern with a second speech pattern;
- accepting the portion of the speech pattern as the voice-command;
- determining an operation corresponding to the voice-command; and
- performing the operation.

2. The method of claim **1**, wherein the voice-command is received during the communication.

3. The method of claim **1**, wherein performing the operation is performing the operation on a remote device.

4. The method of claim **1**, wherein performing the operation establishes a second communication path between a first device that sends the voice-command and second device.

5. The method of claim **4**, wherein the second communication path allows one of a headset to join in a communication between another headset and a communication device, a plurality of headsets to communicate with each other, and a headset to communicate with a plurality of communication devices.

6. The method of claim **1**, wherein the operation is forwarding the voice-command to a remote device.

7. The method of claim **1**, wherein the operation is sending a notification to a user.

8. A computer usable program product in a computer readable medium storing computer executable instructions for controlling devices and applications using voice-commands that, when executed, cause a data processing system to:
- establish a first communication path for receiving a communication;
- receive a voice-command during the communication;
- determine an operation corresponding to the voice-command, the operation including establishing a second communication path between a source of the voice-command and second device, and the second communication path allowing one of: (i)a headset to join in a communication between another headset and a communication device, (ii)a plurality of headsets to communicate with each other, and (iii)a headset to communicate with a plurality of communication devices; and
- perform the operation.

9. The computer usable program product of claim **8**, wherein the instructions causing the data processing system to receive the voice-command further include instructions to:
- process a speech included in the communication;
- identify a speech pattern as including a voice-command;
- determine a portion of the speech pattern as including the voice-command;
- separate the portion of the speech pattern from the speech pattern;
- compare the portion of the speech pattern with a second speech pattern; and
- accept the portion of the speech pattern as the voice-command.

10. The computer usable program product of claim **8**, wherein instructions causing the data processing system to perform the operation include instructions to perform the operation on a remote device.

11. The computer usable program product of claim **8**, wherein the operation forwards the voice-command to a remote device.

12. The computer usable program product of claim **8**, wherein the operation sends a notification to a user.

13. A system for controlling devices and applications using voice-commands, the system comprising:
- a first communication path configured to allows establishing a communication, the communication including a voice-command;
- a user-side communication and voice-command interface coupled to the first communication path and configured to receive the voice-command; and
- a processing engine in communication with the first communication path and the user-side communication and

voice-command interface, configured to process the voice-command, determine an operation corresponding to the voice-command, and perform the operation, the processing engine further configured to process the voice-command by processing a speech, identify a speech pattern as including a voice-command, determine a portion of the speech pattern as including the voice-command, separate the portion of the speech pattern from the speech pattern, compare the portion of the speech pattern with a second speech pattern, and accept the portion of the speech pattern as the voice-command.

14. The system of claim **13**, wherein the user-side communication and voice-command interface receives a voice-command during the communication.

15. The system of claim **13**, wherein performing the operation is one of performing the operation on a remote device, establishing a second communication path between a source of the voice-command and second device, forwarding the voice-command to a remote device, and sending a notification to a user.

16. The system of claim **15**, wherein the second communication path allows one of a headset to join in a communication between another headset and a communication device, a plurality of headsets to communicate with each other, and a headset to communicate with a plurality of communication devices.

* * * * *