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SLEEP MODE FOR AN INTERACTIVE ASSISTANT

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ABSTRACT

An interactive assistant, referred to herein as “an interactive assistant,” “a virtual assistant,” or simply “an assistant,” may, after previously receiving explicit user authorization to process user input, be configured to stop processing further user input (e.g., audible user input) for a period of time or until the occurrence of one or more detected events. Over the course of time, a user may engage in various different interactions with the assistant by submitting queries, performing searches, requesting select information, providing instructions, and the like. At any point in time, the user may request that the interactive assistant enter a sleep mode by instructing the assistant to stop processing further user input. For example, the user may issue an audible command to instruct the interactive assistant to stop listening to or otherwise processing the user’s audible input for a certain period of time (e.g., 10 minutes) or until the occurrence of a particular event (e.g., the completion of a game currently being played). The interactive assistant may then, in response, refrain from listening to or otherwise processing the user’s audible input until the period of time has lapsed or until the particular event has occurred. Once the period of time has lapsed, or the particular event has occurred, the interactive assistant may resume listening to or otherwise processing the user’s input and may, in some cases, optionally provide an indication (e.g., audible tone, visible indicator) to alert the user that the interactive assistant has resumed such processing.

DESCRIPTION

An interactive assistant, such as shown in the example of Figure 1 below, may be included in a computing system that is configured to interact with one or more users. The
computing system may be, include, or otherwise be included in a mobile device (e.g., smart phone, tablet computer, laptop computer, computerized watch, computerized eyewear, computerized gloves), a personal computer, a smart television, a personal digital assistant, a portable gaming system, a media player, a mobile television platform, an automobile navigation and/or entertainment system, a vehicle (e.g., automobile, aircraft) and/or cockpit display, a home or other smart appliance and/or related device (e.g., interconnectable appliance/device via Internet of Things), or any other type of wearable, non-wearable, mobile, or non-mobile computing device, and the computing system may or may not include a display device. In some cases, the interactive assistant may be a voice-assistant that receives audible user commands, processes the commands based on speech recognition operations, and performs corresponding actions, such as providing audible responses to user queries and/or performing certain actions. The interactive assistant may provide or utilize a user interface with which a user can communicate to cause the assistant to output useful information, respond to a user’s queries, or otherwise perform certain operations to help the user complete a variety of real-world or virtual tasks.

Figure 1 below illustrates an example of an interactive assistant that may, at any point during its operation, and based on user instruction, be configured to stop processing further user input (e.g., audible user input) for a period of time or until the occurrence of one or more detected events. The interactive assistant may be executed by or otherwise included in the computing system shown in Figure 1. For example, a user may engage in various different interactions with an interactive assistant by submitting queries, performing searches, requesting select information, providing commands or other instructions, and the like. At any point in time, the user may request that the interactive assistant enter a sleep mode by instructing the assistant...
to stop processing further user input. For example, the user may issue an audible command to instruct the interactive assistant to stop listening to the user’s audible input for a certain period of time or until the occurrence of a particular event. The interactive assistant may then, in response, refrain from listening to or otherwise processing the user’s audible input until the period of time has lapsed or until the particular event has occurred.

Figure 1
Once the period of time has lapsed, or the particular event has occurred, the interactive assistant may resume listening to or otherwise processing the user’s input and may, in some cases, optionally provide an indication (e.g., audible tone, visible indicator) to alert the user that the interactive assistant has resumed such processing. As shown in Figure 1, the computing system that includes the interactive assistant may have or otherwise be communicatively coupled to one or more input devices and one or more output devices. For instance, the input devices may include one or more microphones, a presence-sensitive input device and/or touch-sensitive screen, a mouse, a keyboard, a voice responsive system, a camera, or any other type of device for detecting input from a human or machine. In some cases, the input device may one or more location sensors (GPS components, Wi-Fi components, cellular components), one or more temperature sensors, one or more movement sensors (e.g., accelerometers, gyroscopes), one or more pressure sensors (e.g., barometer), one or more ambient light sensors, and/or one or more other sensors (e.g., camera, infrared proximity sensor, hygrometer, and the like). Other sensors may include a heart rate sensor, magnetometer, glucose sensor, hygrometer sensor, olfactory sensor, compass sensor, step counter sensor, to name a few other non-limiting examples.

The computing system may also include or be communicatively coupled to one or more output devices, such as one or more speakers or display screens, including a presence-sensitive screen and/or a touchscreen, or any other type of device for generating output to a human or machine. In some cases, the input devices and/or output devices may include one or more other type of wearable, non-wearable, mobile, or non-mobile computing devices that are also used by the user. One or more of the input and/or output devices may be external to and communicatively coupled (e.g., via a wired or wireless connection) with the computing system.
The computing system may also include a user interface module that is configured to manage inputs received by the interactive assistant as users interact with the computing system, and the user interface module may be configured to receive additional instructions from applications, services, platforms, or other modules of the interactive assistant that process user input. The user interface module may also be configured to process output that is provided to users, and may be coupled to the input device(s) and output device(s) of the interactive assistant. The computing system may also include a speech recognition module, which may interface with the user interface module and/or the interactive assistant. When a user provides audible input to the interactive assistant (e.g., via commands, questions, queries), the interactive assistant may use the speech recognition module to process such audible input.

As described herein, the speech recognition module, user interface module, and interactive assistant are configured to utilize and/or process information received from the input devices only after receiving explicit authorization from the user to do so. The computing system may provide the user (e.g., via the user interface module and/or the interactive assistant) with detailed information about the requested use of data collected by input devices for use by the interactive assistant, in conjunction with the use of specified functions or applications (e.g., one or more of the search application, content delivery applications, or other applications). The speech recognition module, user interface module, and/or interactive assistant only use such data collected by input devices after receiving explicit authorization from user to do so. After receiving such authorization, these modules are configured only to use the data gathered by the input devices for the use or uses authorized by the user.

Further to the descriptions below, a user may be provided with controls allowing the user to make an election as to if and when the interactive assistant, the computing system, and/or the
external computing systems described herein can collect or make use of supplemental data (e.g., user information or contextual information about a user’s social network, social actions or activities, profession, a user’s preferences, or a user’s current location), and if and when the user is sent content or communications from a computing system. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user’s identity may be treated so that no personally identifiable information can be determined for the user, or a user’s geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined. Thus, the user may have control over what supplemental data is collected about the user, how that supplemental data is used, and what supplemental data is provided to the user.

As shown in Figure 1, the computing system includes a search application. Over time, and after having provided the explicit authorization noted above to approve the processing of user input data, the user may submit one or more queries to the interactive assistant to request content. Based on such queries, the search application may search for content in one or more content repositories that are local to the computing system and/or stored on one or more external computing systems (e.g., content providers), such as shown in Figure 1. Upon identifying content that is responsive to the user’s queries (e.g., content that satisfies one or more criteria specified in the queries), the search application may output the identified content to the user, such as via audible and/or visual output. In addition, the search application may store the history of these searches in one or more datastores containing history information. As shown in Figure 1, the history information may be stored locally on the computing system and/or on the one or more external computing systems, and may include any information or metadata associated with
these searches and corresponding search results. This history information may be part of or otherwise included in the contextual information that is used by one or more content delivery applications.

The search application and the content delivery applications may be executed locally on the computing system. In some cases, however, any of the search application or the content delivery applications may be executed on the one or more external computing systems and may be invoked by the interactive assistant.

The content delivery applications may include one or more applications that are configured to use such contextual information and deliver different types of content to the user. For instance, the content delivery applications may include one or more applications to deliver news content, video content, image content, map content, audiobook content, and the like. When the content is included in the content repositories local to the computing system, the content delivery applications and/or the interactive assistant may output the content directly via the output devices. When the content is included in content repositories stored on the one or more external computing systems, the external computing systems may stream the content to the computing system, and the computing system may then output the received content via the output devices. In such fashion, the computing system is capable of delivering received content even if the computing system is, at a certain point in time, in an offline mode or otherwise disconnected from the external computing systems.

At any point in time, the user may request that the interactive assistant enter a sleep mode by instructing the assistant to temporarily stop processing further user input. For example, if the user is currently engaging in a conversation with another user, the user may not want the interactive assistant to accidentally interpret user-to-user dialogue as input or commands for
processing by the interactive assistant. Or, the user may simply want the interactive assistant to enter a sleep mode for one or more other reasons, and the user may request that the interactive assistant refrain from processing any of the user’s input (e.g., audible input or manually provided input) for at least a period of time.

In these cases, the user may instruct the interactive assistant to refrain from processing further input from the user for a certain period of time or until the occurrence of one or more events. As one non-limiting example, the user may issue an audible command to instruct the interactive assistant to “stop listening for 10 minutes,” as shown in Figure 1. In this case, the interactive assistant would be configured to stop listening to the user’s audible input for a certain period of time (e.g., 10 minutes), as instructed by the user. In some cases, the interactive assistant and/or the user interface module may turn off the microphone or other ones of the user input devices. Once the period of time (e.g., 10 minutes) has lapsed, the interactive assistant and/or the user interface module may turn back on the microphone or other ones the user input devices and resume processing user input. In other cases, in response to receiving the user’s command to “stop listening for 10 minutes,” rather than turning off the microphone or other user input devices, the interactive assistant and/or the user interface module may disregard any user input received from the user input devices for the specified period of time. Once the period of time has lapsed, the interactive assistant and/or the user interface module may resume processing the user input received from the user input devices.

In some cases, the user may specify a particular time of day rather than a time duration. For instance, rather than saying “stop listening for 10 minutes,” the user may alternatively instruct the interactive assistant to “stop listening until 4pm.” In this instance, at 4pm, the interactive assistant and/or the user interface module may resume processing the user input
received from the user input devices. Once the period of time has lapsed, or the particular event
has occurred, the interactive assistant may resume listening to or otherwise processing the user’s
input and may, in some cases, optionally provide an indication (e.g., audible tone, visible
indicator) to alert the user that the interactive assistant has resumed such processing.

As another example, and as also illustrated in Figure 1, the user may instruct the
interactive assistant to refrain from processing further user input until one or more events have
occurred. The interactive assistant may process events or signals initiated locally at the
computing system and/or from the external computing systems to determine when these events
have occurred. The events may be any type of event associated with operation of the computing
system and/or external computing systems, as well as any network activity. For example, the
events may relate to execute of the search application or any of the other applications that are
executed on the computing system.

As one non-limiting example, the user may be playing a particular game on the
computing system. During the course of the game, the user may actively provide audible input
to the computing system that is processed during game play. As a result, the user may request
that the interactive assistant temporarily refrain from processing audible input from the user, in
an effort to prevent the interactive assistant from mistakenly interpreting the user’s input during
game play as instructions or other feedback to be processed by the interactive assistant. In this
case, the user may issue an instruction to the interactive assistant to “stop listening until this
game is over.”

Upon receiving this instruction, the interactive assistant may temporarily stop processing
audible input from the user until it has received a signal indicating that the current game is over.
In this example, the interactive assistant may not turn off the microphone as it is still being used
for game play. However, the interactive assistant may stop listening to or ignore any audible input from the user until the current game is over. (In some cases, the interactive assistant may turn off the microphone if the user has submitted an explicit request to “turn off the microphone.” The user may submit such a request in the case, for example, that the user’s game play does not involve any other audible input.)

For the interactive assistant to determine that the current game is over, the interactive assistant may receive one or more signals from the application associated with the game, or from the operating system executing on the computing system, that the game has completed or otherwise been terminated. Upon receiving these one or more signals, the interactive assistant may determine that the game is over and may automatically resume listening for and processing audible input from the user for processing.

The interactive assistant may, in some cases, provide an override or cancel function to, e.g., recover from possible errors, or even pranks, due to use of the interactive assistant. For example, a user may mistakenly issue (or, e.g., as a prank, issue) a command to “stop listening for a million minutes.” Upon receiving this command, the interactive assistant may process the command and refrain from listening to the user for the specified time duration. However, in order to override or cancel the command, the user may perform another, non-audible user interface function. For example, the user may, e.g., tap or double tap a surface of the computing system, interact with a control button of the computing system, or provide another non-audible input to one of the input devices, to override or cancel the command. Upon receiving such input, the interactive assistant will cancel the command and resume processing audible user input from the user.
As another example, rather than playing an interactive game on the computing system using one of the applications that executes on the computing system, the user may alternatively be watching a sporting event on television. When the user issues the command to the interactive assistant to “stop listening until this game is over,” the user may intend for the interactive assistant to stop listening until the sporting event on television (e.g., football game) is over.

Upon receiving the command, the interactive assistant may determine that the user is referring to the sporting event as the “game” based, e.g., on prior interactions with the user associated with the sporting event or other contextual triggers. For example, the user may have previously requested content associated with the sporting event, or may have requested that the interactive assistant program a television device to a channel associated with the sporting event.

In this example, the interactive assistant may, in certain cases, turn off the microphone of the computing system. In these cases, the interactive assistant may determine that the game for the sporting event is over based on certain contextual information (e.g., television programming schedule, user’s calendar showing a start and end time for the sporting event). For these cases, the interactive assistant may turn off or disable the microphone.

As yet another example, the event could be associated with an incoming email to which the user wants to respond. For example, the user may issue a request to “stop listening until receiving an email from dad.” The user may request that the interactive assistant enter a sleep mode and refrain from processing any user input (e.g., audible or manually entered input) until the interactive assistant becomes aware of an incoming email from the user’s father.

Upon receiving this instruction, the interactive assistant may temporarily stop processing input from the user until it has received a signal associated with an incoming email from the user’s father. The interactive assistant may stop listening to or ignore any audible input received
from the user until interactive assistant receives a signal (e.g., from an email application executing on the computing system) indicating receipt of an email from the user’s father. (In some cases, the interactive assistant may turn off the microphone if the user has submitted an explicit request to “turn off the microphone.” In other cases, the interactive assistant may not turn off the microphone but may instead disregard any user input until detection of the indicated event.) Upon receiving one or more signals indicating receipt of an email from the user’s father, the interactive assistant may automatically resume listening for and processing audible input from the user for processing. For example, the interactive assistant may process audible input from the user regarding the contents of the email message, or regarding composition of a reply to such a message.