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(54) **DIALOG SYSTEM WITH AUTOMATIC REACTIVATION OF SPEECH ACQUIRING MODE**

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(73) Assignee: **GOOGLE LLC**, Mountain View, CA (US)

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CPC ***G10L 15/22*** (2013.01); ***G06F 3/167*** (2013.01); ***G06F 16/3329*** (2019.01);
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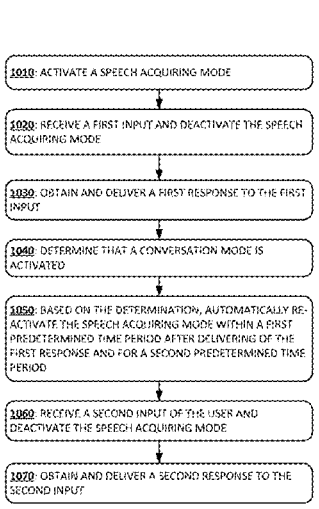
Primary Examiner — Ovidio Escalante
(74) *Attorney, Agent, or Firm* — Middleton Reutlinger

(57) **ABSTRACT**

Embodiments of the disclosure generally relate to a dialog system allowing for automatically reactivating a speech acquiring mode after the dialog system delivers a response to a user request. The reactivation parameters, such as a delay, depend on a number of predetermined factors and conversation scenarios. The embodiments further provide for a method of operating of the dialog system. An exemplary method comprises the steps of: activating a speech acquiring mode, receiving a first input of a user, deactivating the speech acquiring mode, obtaining a first response associated with the first input, delivering the first response to the user, determining that a conversation mode is activated, and, based on the determination, automatically re-activating the speech acquiring mode within a first predetermined time period after delivery of the first response to the user.

18 Claims, 15 Drawing Sheets



Related U.S. Application Data

which is a continuation-in-part of application No. PCT/IB2012/056955, filed on Dec. 4, 2012, and a continuation-in-part of application No. 14/721,044, filed on May 26, 2015, which is a continuation-in-part of application No. PCT/IB2012/056973, filed on Dec. 5, 2012, and a continuation-in-part of application No. 14/775,729, filed as application No. PCT/RU2013/000202 on Mar. 15, 2013, and a continuation-in-part of application No. 14/901,026, filed as application No. PCT/RU2013/000551 on Jun. 27, 2013.

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G06F 3/16	(2006.01)
G06F 17/30	(2006.01)
G10L 25/48	(2013.01)
G10L 15/08	(2006.01)
G06F 16/332	(2019.01)
G10L 15/26	(2006.01)
G10L 15/30	(2013.01)

(52) **U.S. Cl.**

CPC ***G10L 15/083*** (2013.01); ***G10L 15/1815*** (2013.01); ***G10L 15/1822*** (2013.01); ***G10L 15/26*** (2013.01); ***G10L 15/30*** (2013.01); ***G10L 25/48*** (2013.01); *G10L 15/18* (2013.01); *G10L 2015/223* (2013.01); *G10L 2015/228* (2013.01)

(58) **Field of Classification Search**

CPC G10L 15/1815; G10L 15/18; G10L 2015/223; G10L 2015/228; G06F 16/3329; G06F 3/167

USPC 704/270, 235

See application file for complete search history.

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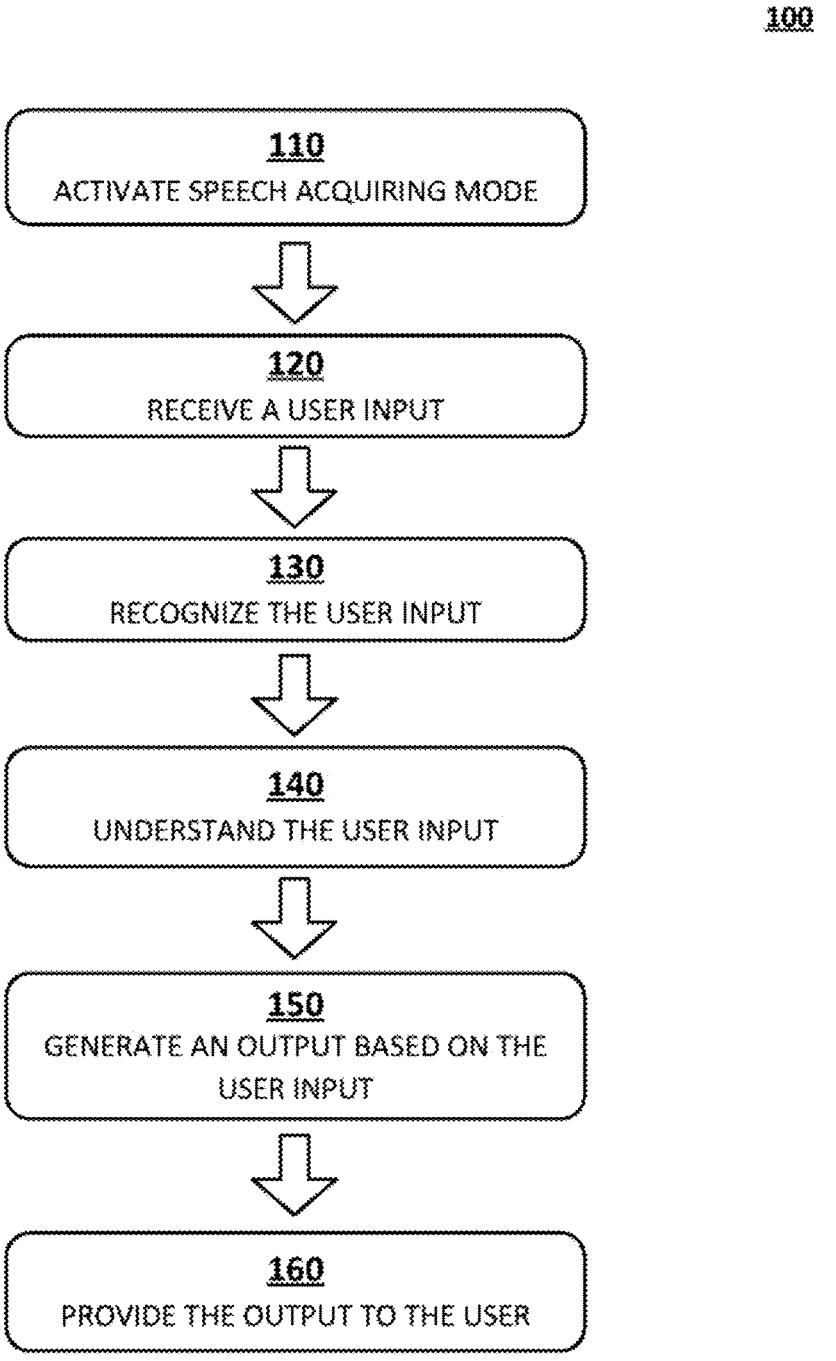
100
110
ACTIVATE SPEECH ACQUIRING MODE
120
RECEIVE A USER INPUT
130
RECOGNIZE THE USER INPUT
140
UNDERSTAND THE USER INPUT
150
GENERATE AN OUTPUT BASED ON THE USER INPUT
160
PROVIDE THE OUTPUT TO THE USER

FIG. 1

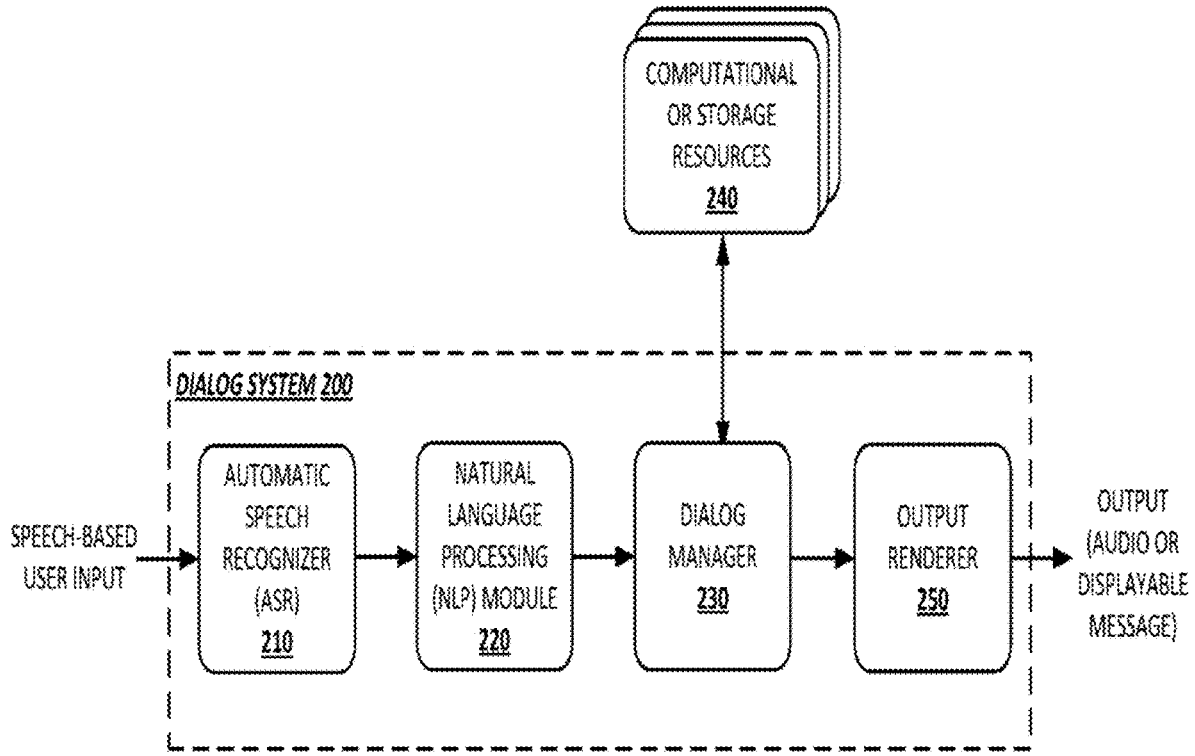
COMPUTATIONAL OR STORAGE RESOURCES 240
DIALOG SYSTEM 200
SPEECH-BASED USER INPUT
AUTOMATIC SPEECH RECOGNIZER (ASR) 210
NATURAL LANGUAGE PROCESSING (NLP) MODULE 220
DIALOG MANAGER 230
OUTPUT RENDERER 250
OUTPUT (AUDIO OR DISPLAYABLE MESSAGE)

FIG. 2

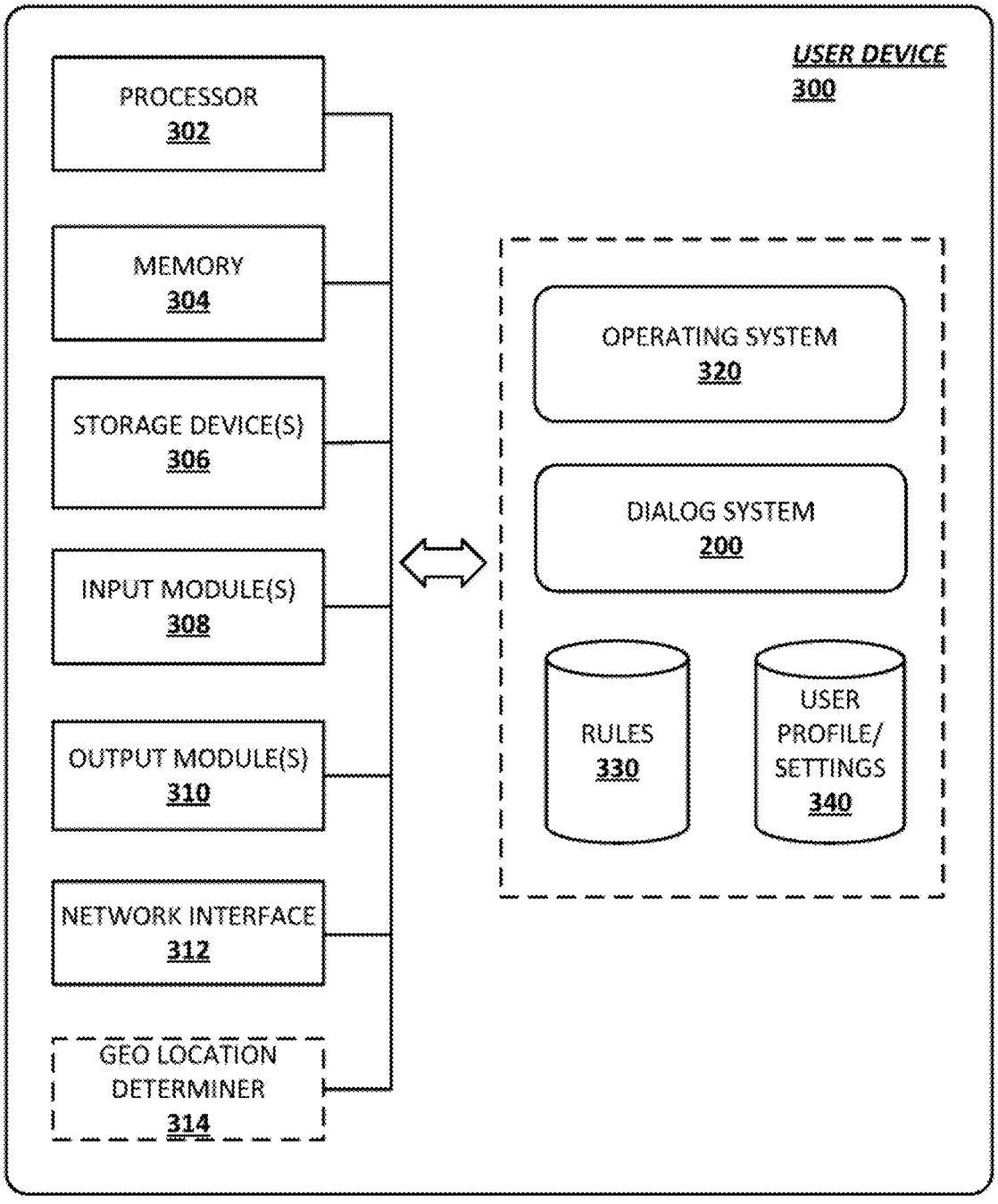
USER DEVICE
300
PROCESSOR
302
MEMORY
304
STORAGE DEVICE(S)
306
INPUT MODULE(S)
308
OUTPUT MODULE(S)
310
NETWORK INTERFACE
312
GEO LOCATION DETERMINER
314
OPERATING SYSTEM
320
DIALOG SYSTEM
200
RULES
330
USER PROFILE/ SETTINGS
340

FIG. 3

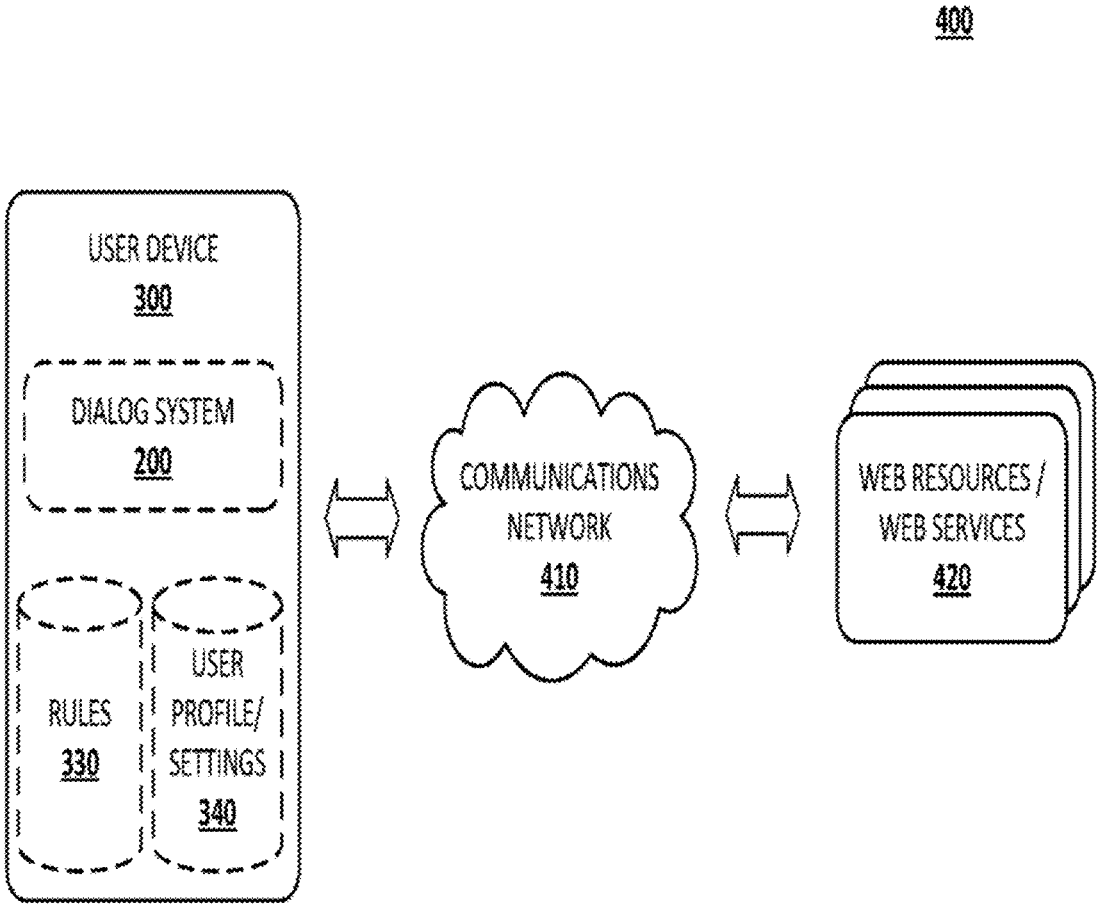
400
USER DEVICE
300
DIALOG SYSTEM
200
RULES
330
USER PROFILE/ SETTINGS
340
COMMUNICATIONS NETWORK
410
WEB RESOURCES / WEB SERVICES
420

FIG. 4

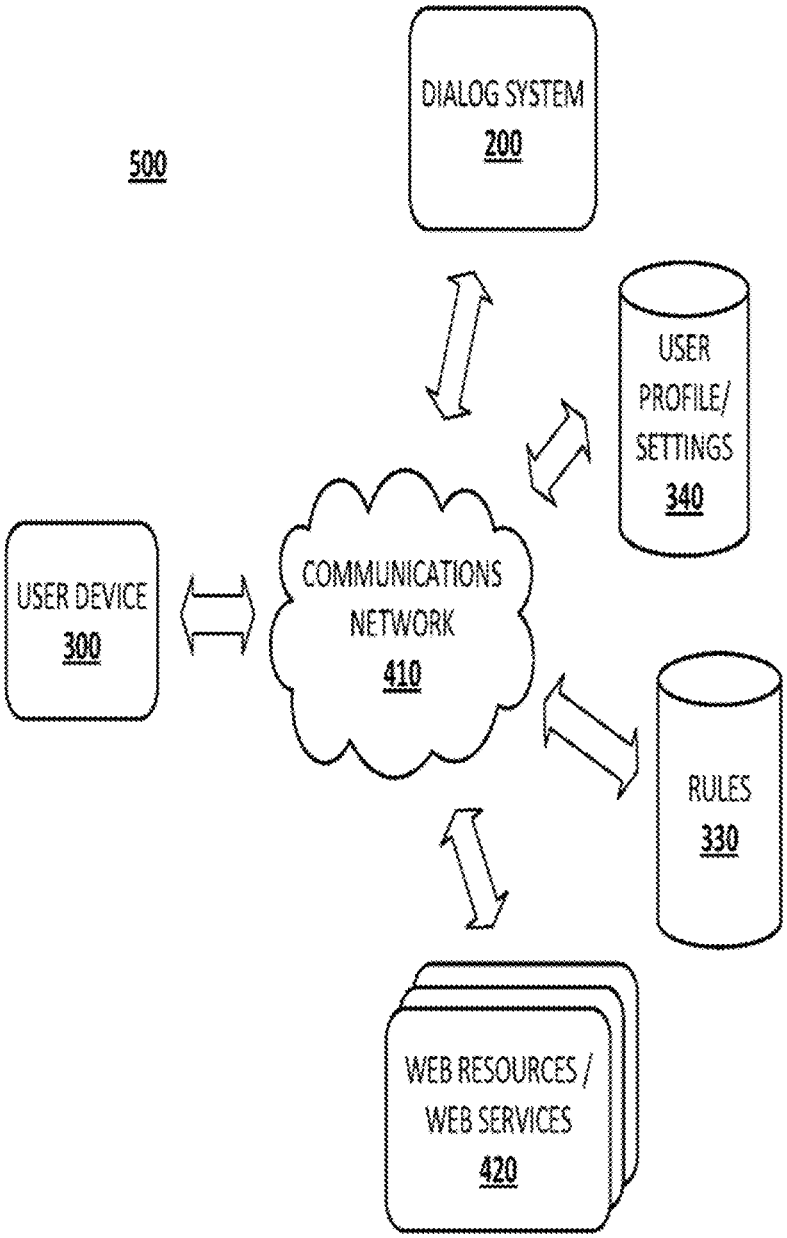
500
DIALOG SYSTEM
200
USER
PROFILE/
SETTINGS
340
USER DEVICE
300
COMMUNICATIONS
NETWORK
410
RULES
330
WEB RESOURCES /
WEB SERVICES
420

FIG. 5

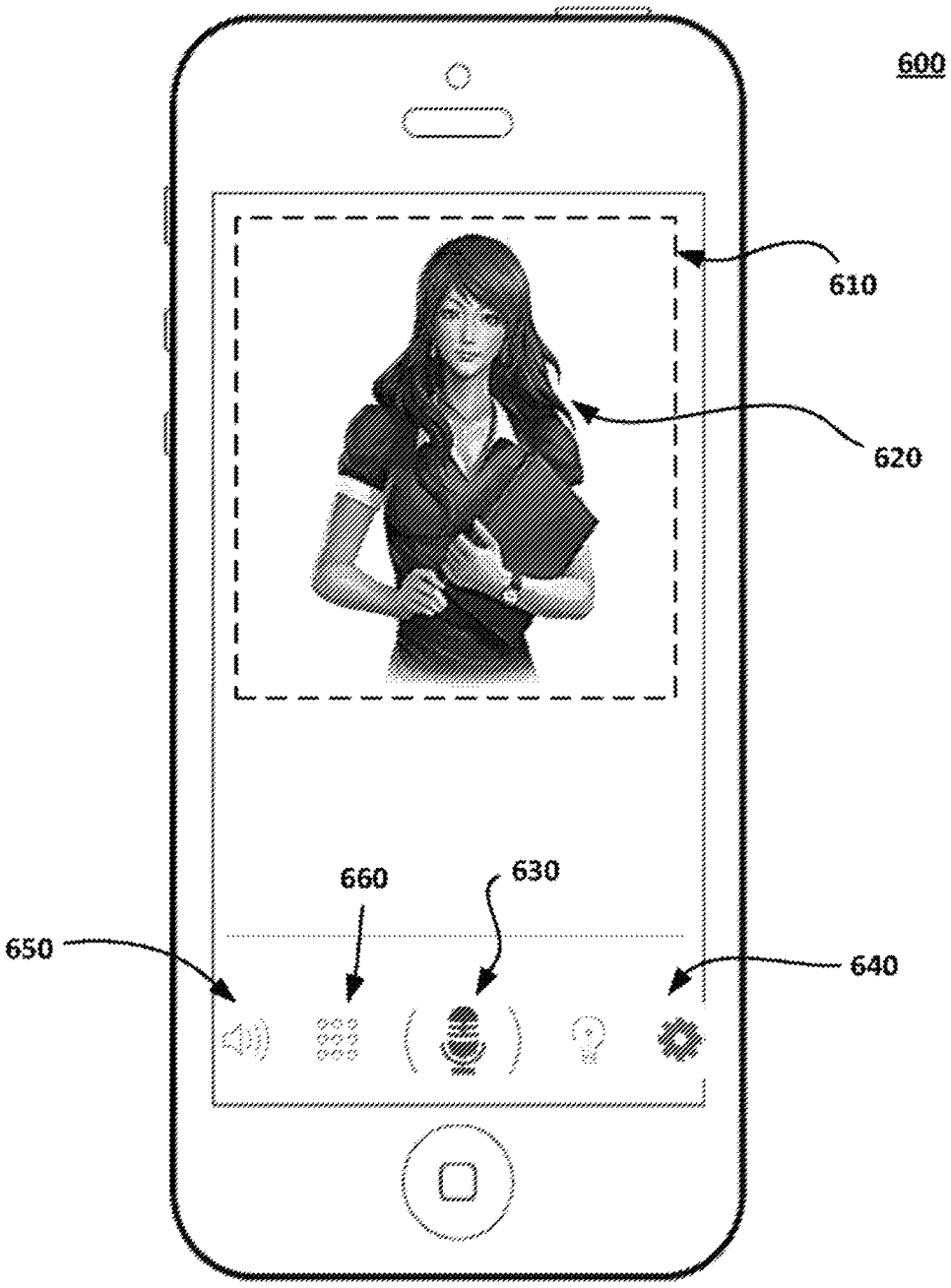

FIG. 6

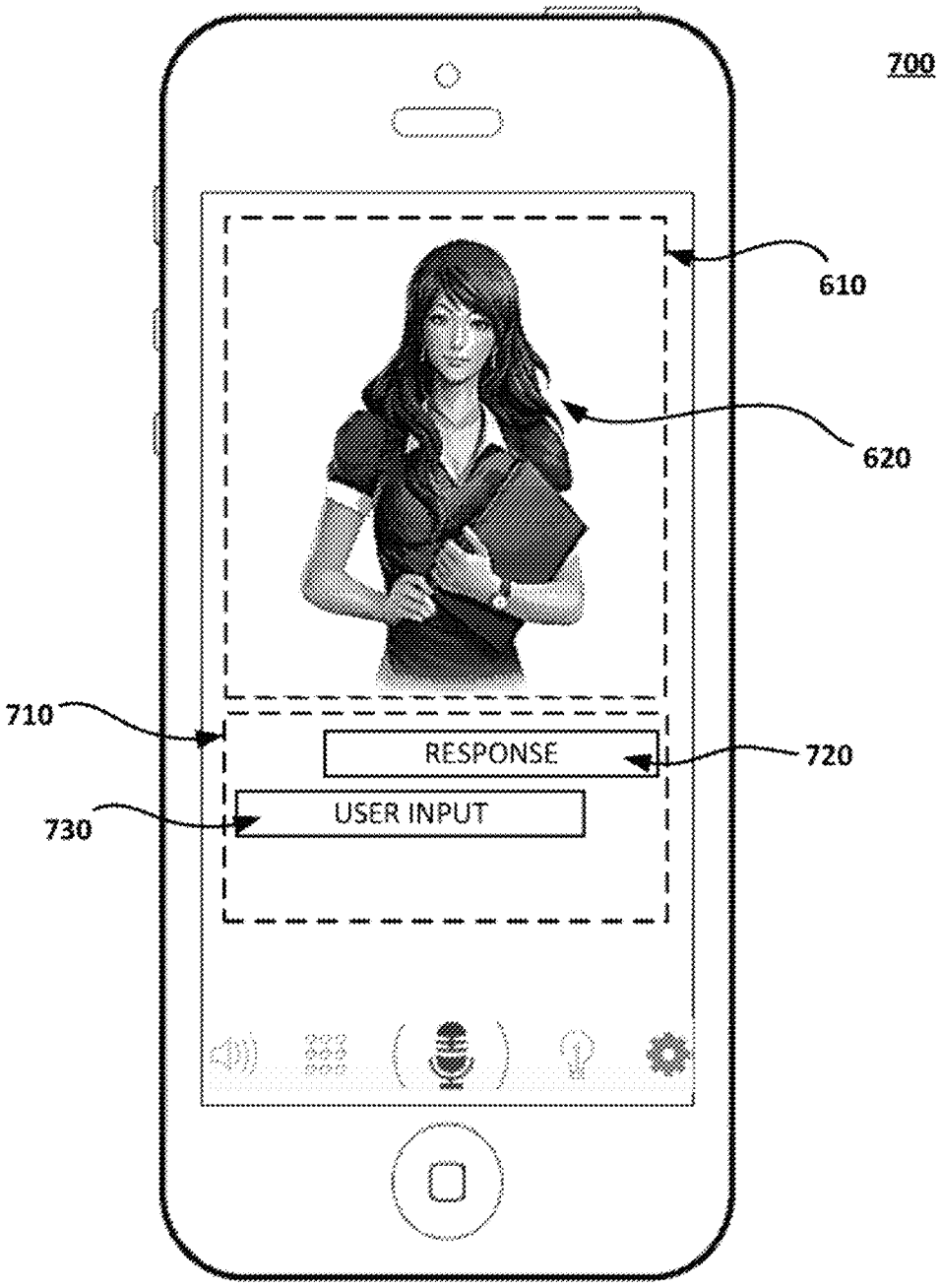

FIG. 7

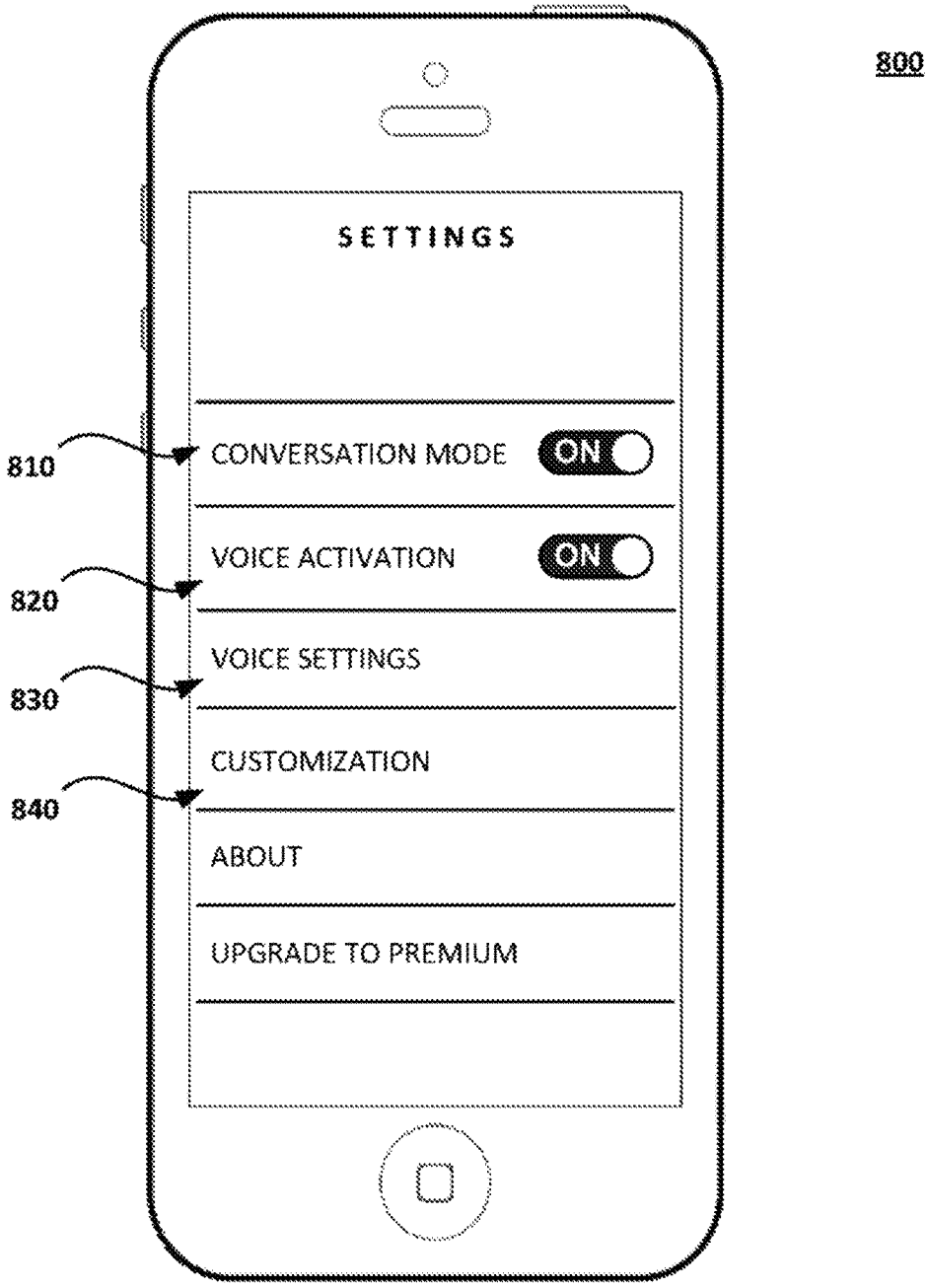
800
SETTINGS
CONVERSATION MODE
ON
VOICE ACTIVATION
ON
VOICE SETTINGS
CUSTOMIZATION
ABOUT
UPGRADE TO PREMIUM
810
820
830
840

FIG. 8

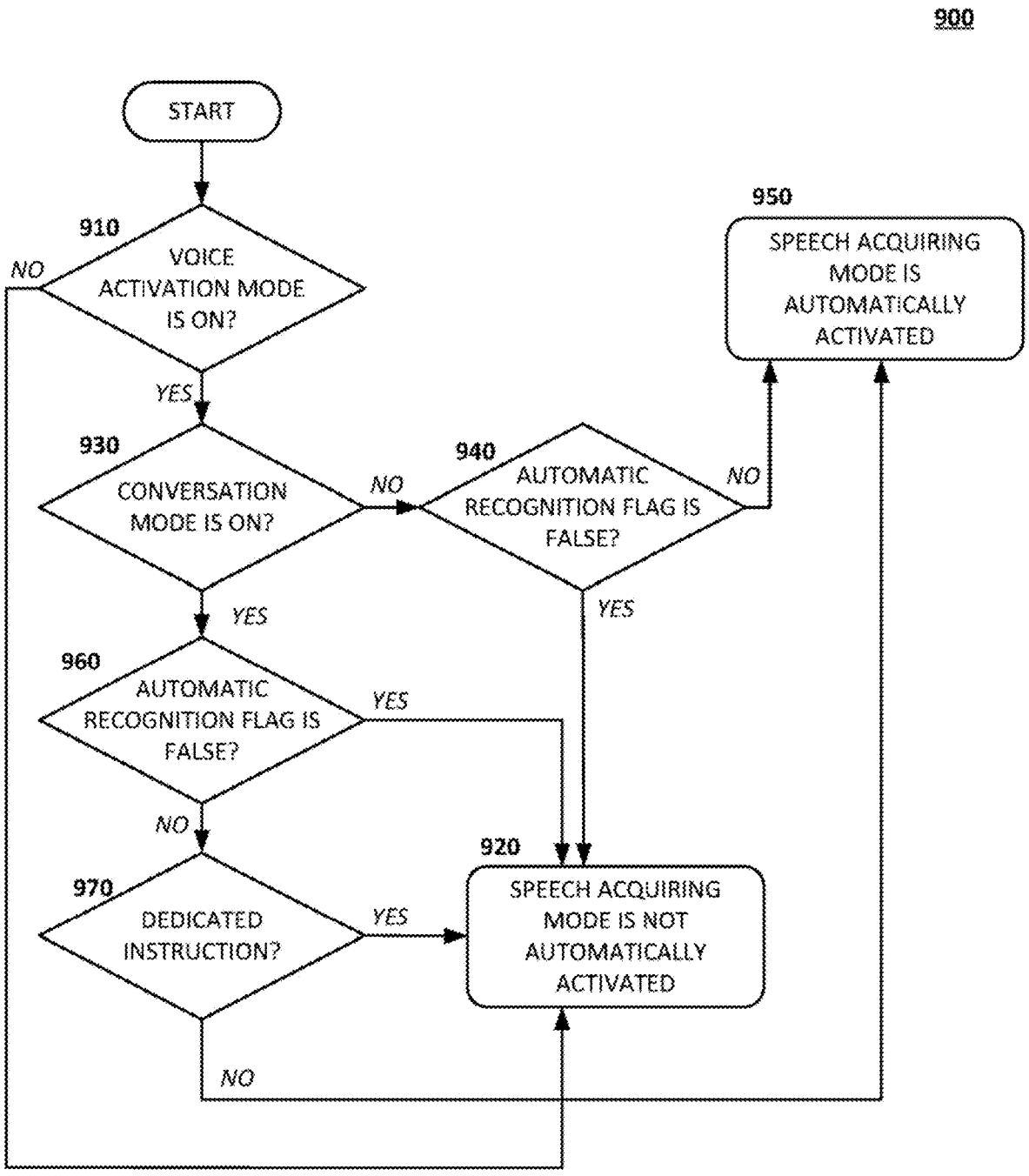
900
START
910
VOICE ACTIVATION MODE IS ON?
NO
YES
930
CONVERSATION MODE IS ON?
NO
940
AUTOMATIC RECOGNITION FLAG IS FALSE?
NO
950
SPEECH ACQUIRING MODE IS AUTOMATICALLY ACTIVATED
YES
YES
960
AUTOMATIC RECOGNITION FLAG IS FALSE?
YES
NO
970
DEDICATED INSTRUCTION?
YES
920
SPEECH ACQUIRING MODE IS NOT AUTOMATICALLY ACTIVATED
NO

FIG. 9

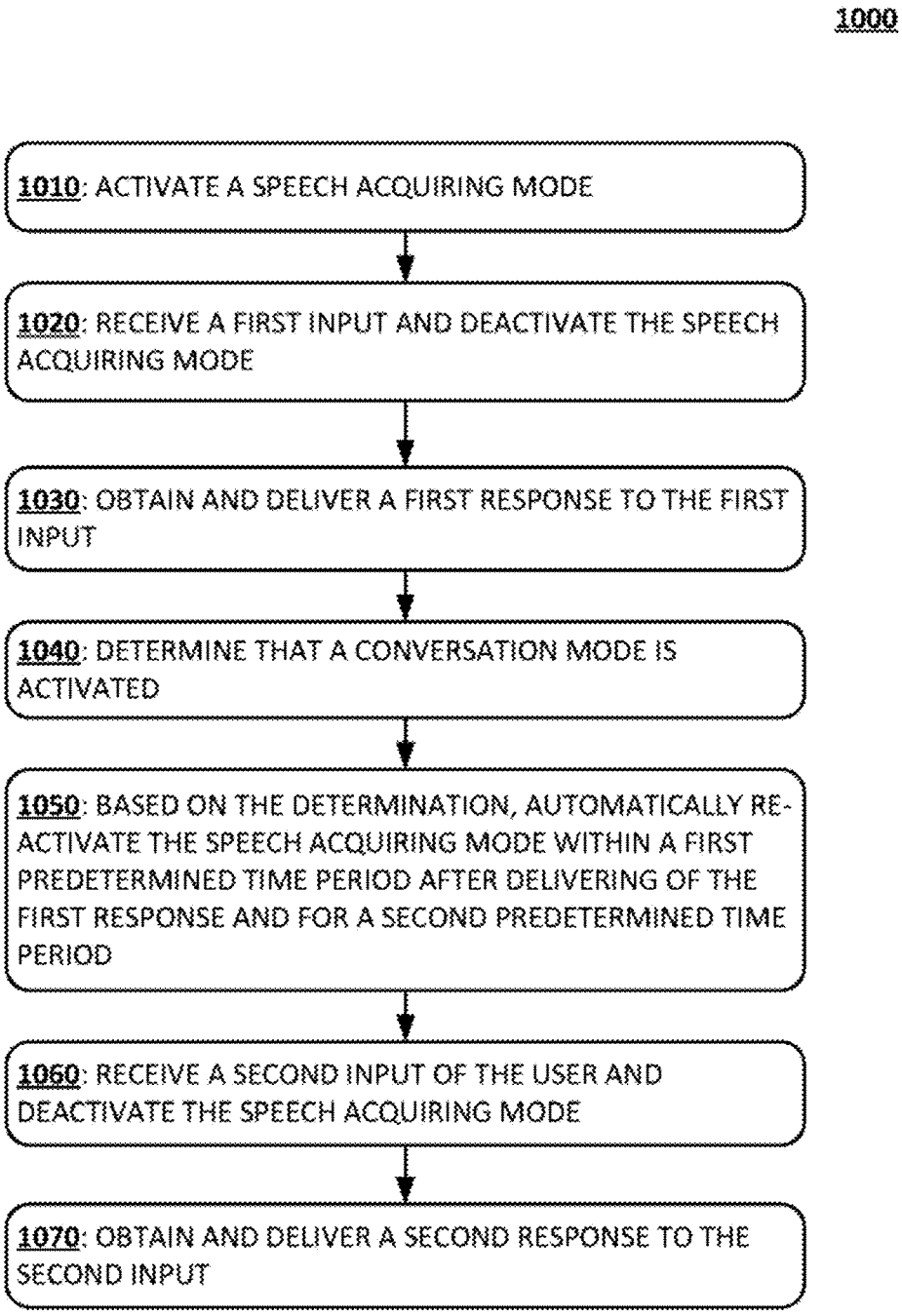
1000
1010: ACTIVATE A SPEECH ACQUIRING MODE
1020: RECEIVE A FIRST INPUT AND DEACTIVATE THE SPEECH ACQUIRING MODE
1030: OBTAIN AND DELIVER A FIRST RESPONSE TO THE FIRST INPUT
1040: DETERMINE THAT A CONVERSATION MODE IS ACTIVATED
1050: BASED ON THE DETERMINATION, AUTOMATICALLY RE-ACTIVATE THE SPEECH ACQUIRING MODE WITHIN A FIRST PREDETERMINED TIME PERIOD AFTER DELIVERING OF THE FIRST RESPONSE AND FOR A SECOND PREDETERMINED TIME PERIOD
1060: RECEIVE A SECOND INPUT OF THE USER AND DEACTIVATE THE SPEECH ACQUIRING MODE
1070: OBTAIN AND DELIVER A SECOND RESPONSE TO THE SECOND INPUT

FIG. 10

1100

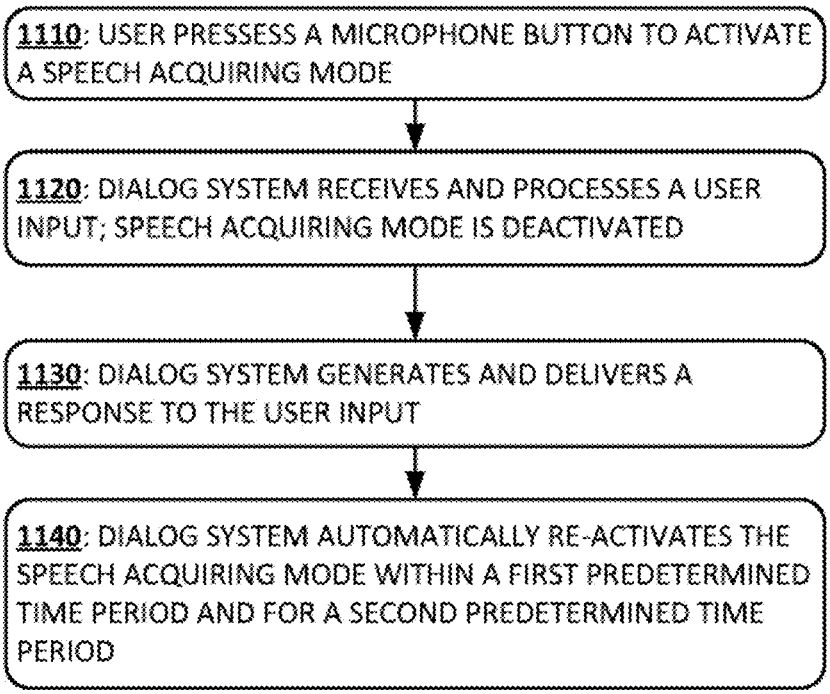
1110: USER PRESSESS A MICROPHONE BUTTON TO ACTIVATE A SPEECH ACQUIRING MODE
1120: DIALOG SYSTEM RECEIVES AND PROCESSES A USER INPUT; SPEECH ACQUIRING MODE IS DEACTIVATED
1130: DIALOG SYSTEM GENERATES AND DELIVERS A RESPONSE TO THE USER INPUT
1140: DIALOG SYSTEM AUTOMATICALLY RE-ACTIVATES THE SPEECH ACQUIRING MODE WITHIN A FIRST PREDETERMINED TIME PERIOD AND FOR A SECOND PREDETERMINED TIME PERIOD

FIG. 11

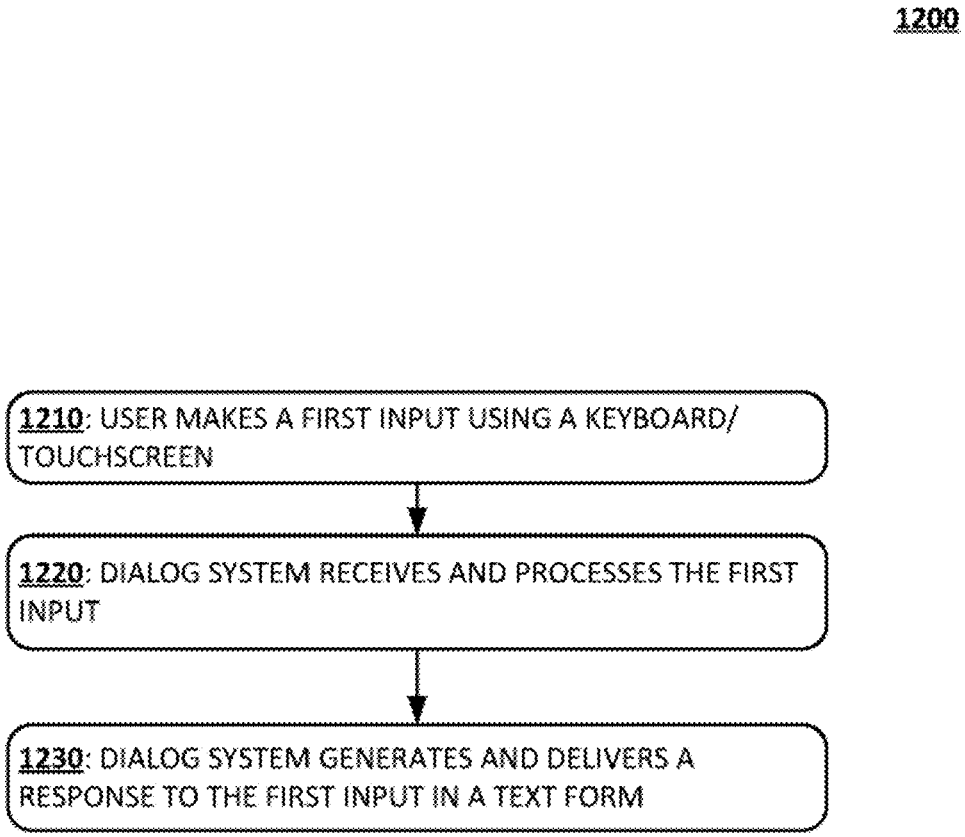
1200
1210: USER MAKES A FIRST INPUT USING A KEYBOARD/ TOUCHSCREEN
1220: DIALOG SYSTEM RECEIVES AND PROCESSES THE FIRST INPUT
1230: DIALOG SYSTEM GENERATES AND DELIVERS A RESPONSE TO THE FIRST INPUT IN A TEXT FORM

FIG. 12

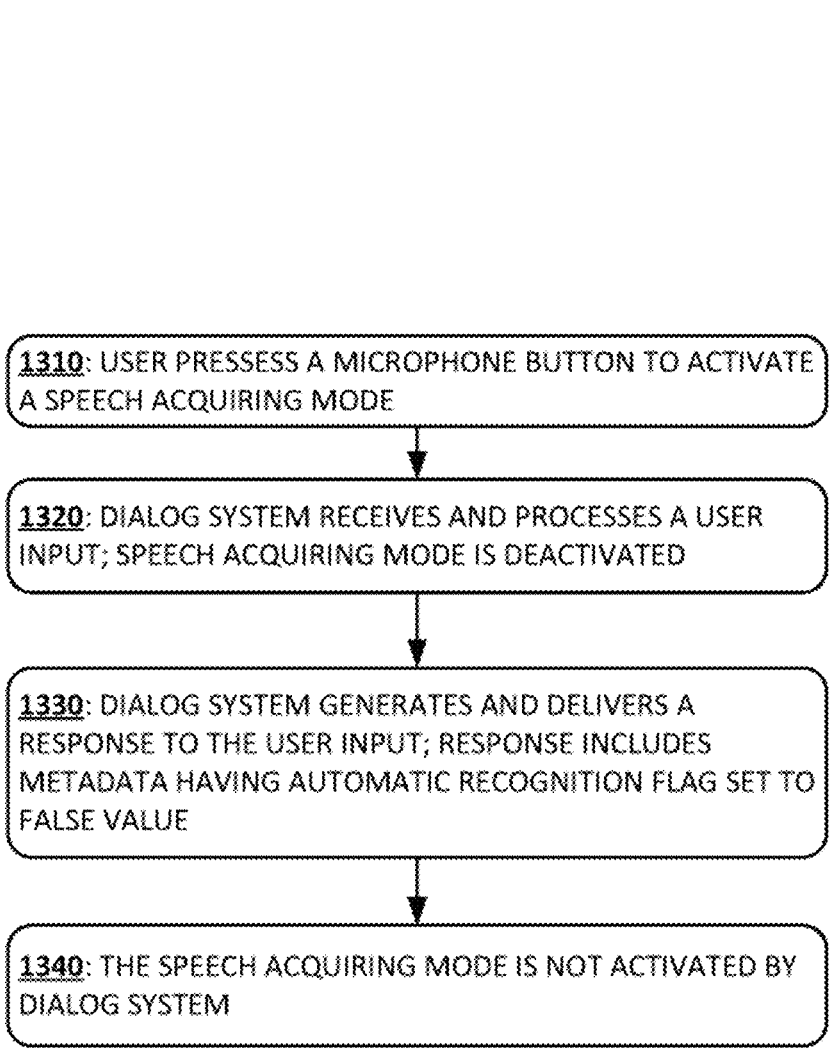
1300
1310: USER PRESSESS A MICROPHONE BUTTON TO ACTIVATE A SPEECH ACQUIRING MODE
1320: DIALOG SYSTEM RECEIVES AND PROCESSES A USER INPUT; SPEECH ACQUIRING MODE IS DEACTIVATED
1330: DIALOG SYSTEM GENERATES AND DELIVERS A RESPONSE TO THE USER INPUT; RESPONSE INCLUDES METADATA HAVING AUTOMATIC RECOGNITION FLAG SET TO FALSE VALUE
1340: THE SPEECH ACQUIRING MODE IS NOT ACTIVATED BY DIALOG SYSTEM

FIG. 13

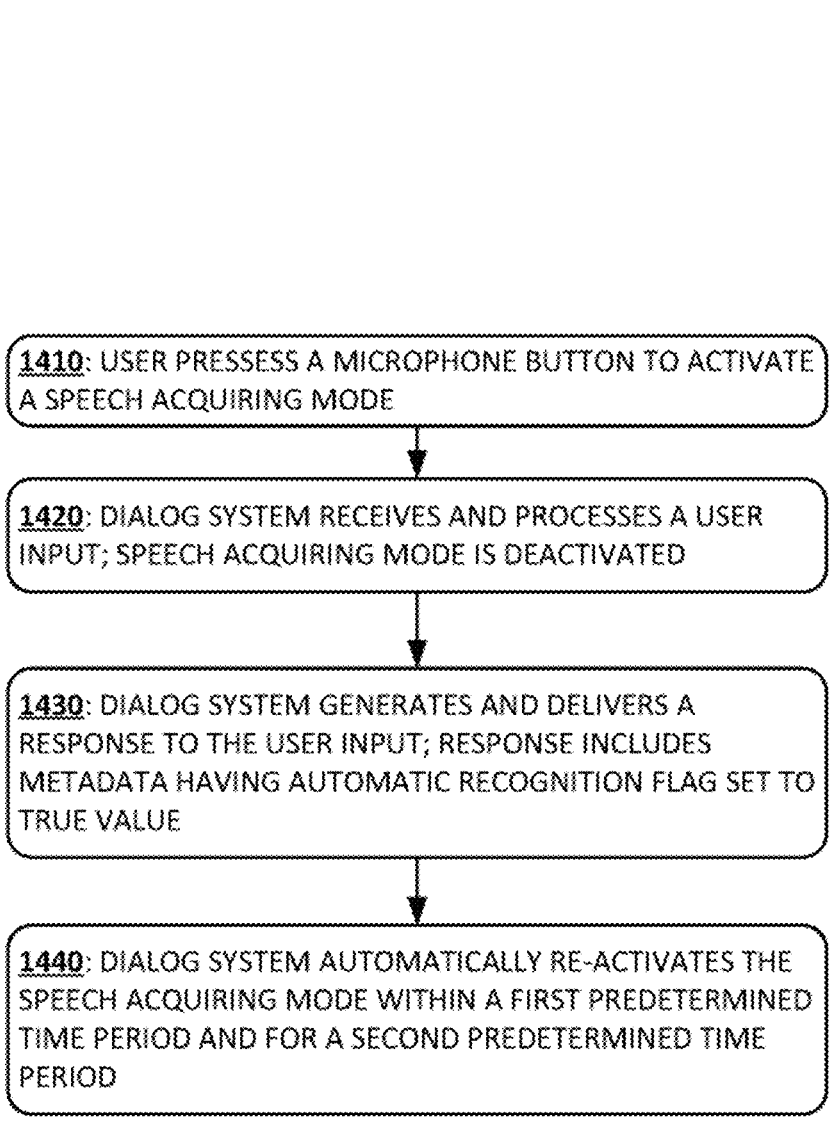
1400
1410: USER PRESSESS A MICROPHONE BUTTON TO ACTIVATE A SPEECH ACQUIRING MODE
1420: DIALOG SYSTEM RECEIVES AND PROCESSES A USER INPUT; SPEECH ACQUIRING MODE IS DEACTIVATED
1430: DIALOG SYSTEM GENERATES AND DELIVERS A RESPONSE TO THE USER INPUT; RESPONSE INCLUDES METADATA HAVING AUTOMATIC RECOGNITION FLAG SET TO TRUE VALUE
1440: DIALOG SYSTEM AUTOMATICALLY RE-ACTIVATES THE SPEECH ACQUIRING MODE WITHIN A FIRST PREDETERMINED TIME PERIOD AND FOR A SECOND PREDETERMINED TIME PERIOD

FIG. 14

1500

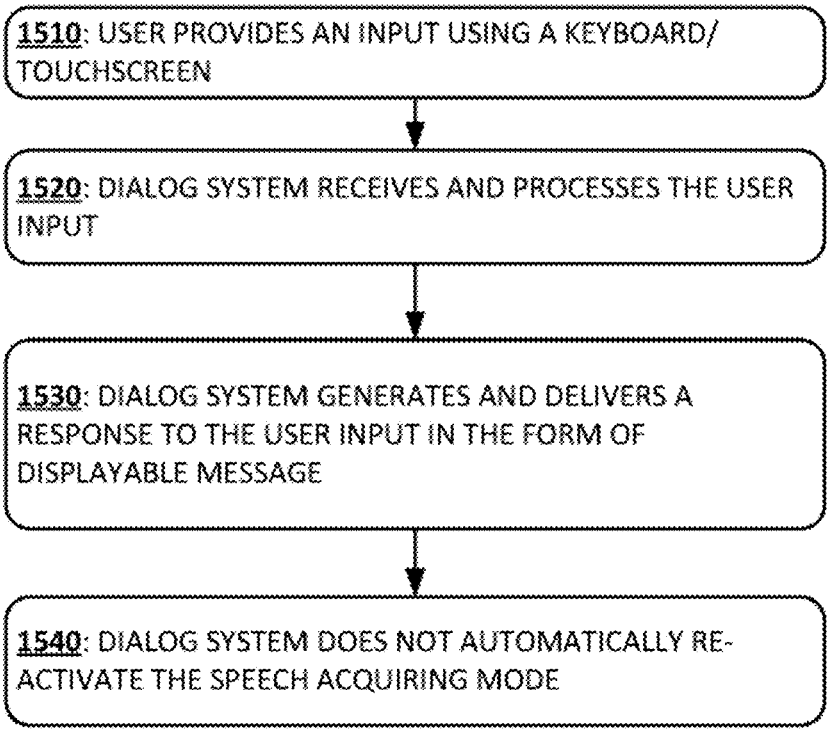
1510: USER PROVIDES AN INPUT USING A KEYBOARD/ TOUCHSCREEN
1520: DIALOG SYSTEM RECEIVES AND PROCESSES THE USER INPUT
1530: DIALOG SYSTEM GENERATES AND DELIVERS A RESPONSE TO THE USER INPUT IN THE FORM OF DISPLAYABLE MESSAGE
1540: DIALOG SYSTEM DOES NOT AUTOMATICALLY RE-ACTIVATE THE SPEECH ACQUIRING MODE

FIG. 15

DIALOG SYSTEM WITH AUTOMATIC REACTIVATION OF SPEECH ACQUIRING MODE

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

[CROSS-REFERENCE TO RELATED APPLICATIONS]

[This application is a Continuation-in-Part of U.S. patent application Ser. No. 14/721,012, entitled "METHOD FOR USER COMMUNICATION WITH INFORMATION DIALOGUE SYSTEM", filed on May 26, 2015, which claims priority to Russian Federation Patent Application No. 2012150996, filed on Nov. 28, 2012, U.S. patent application Ser. No. 14/721,044, entitled "METHOD FOR USER' TRAINING OF INFORMATION DIALOGUE SYSTEM", filed on May 26, 2015, which claims priority to Russian Federation Patent Application No. 2012150997, filed on Nov. 28, 2012, U.S. patent application Ser. No. 14/775,729, entitled "SELECTIVE SPEECH RECOGNITION FOR CHAT AND DIGITAL PERSONAL ASSISTANT SYSTEMS", filed on Sep. 14, 2015, U.S. patent application Ser. No. 14/901,026, entitled "GENERATING DIALOG RECOMMENDATIONS FOR CHAT INFORMATION SYSTEMS BASED ON USER INTERACTION AND ENVIRONMENTAL DATA", filed on Dec. 27, 2015, which are incorporated herein by reference in their entireties for all purposes.]

TECHNICAL FIELD

This disclosure relates generally to dialog systems, conversational agents and chat information systems and, more particularly, to dialog systems having the feature of automatic reactivation of speech acquiring mode enabling a user, in certain conversation scenarios, to make an additional request after an answer to a user's previous request is delivered by the dialog system.

BACKGROUND

The approaches described in this section could be pursued, but are not necessarily approaches that have been previously conceived or pursued. Therefore, unless otherwise indicated herein, the approaches described in this section are not prior art to the claims in this application and are not admitted to be prior art by inclusion in this section.

Today, dialog systems are widely used in the information technology industry, especially as mobile applications for wireless telephones and tablet computers. Generally, a dialog system refers to a computer-based agent having a human-centric interface for accessing, processing, managing, and delivering information. Dialog systems are also known as chat information systems, spoken dialog systems, conversational agents, chatter robots, chatterbots, chatbots, chat agents, digital personal assistants, and automated online assistants, to name a few. All these terms are within the scope of the present disclosure and referred to as a "dialog system" for simplicity.

Traditionally, a dialog system interacts with its users in natural language to simulate an intelligent conversation and provide personalized assistance to the users. For example, a user may generate requests to the dialog system in the form of conversational questions, such as "Where is the nearest hotel?" or "What is the weather like in Arlington?", and receive corresponding answers from the dialog system in the form of an audio and/or displayable message. The users may also provide voice commands to the dialog system so as to perform certain functions including, for example, generating e-mails, making phone calls, searching particular information, acquiring data, navigating, providing notifications and reminders, and so forth. Thus, dialog systems are now very popular and are of great help, especially for holders of portable electronic devices such as smart phones, cellular phones, tablet computers, gaming consoles, and the like.

Historically, dialog systems, and especially spoken dialog systems, require a user to activate a dialog system before he makes a request. It is obvious that otherwise dialog systems acquire all spoken words made by the user, which will lead to the dialog system overloading, excessive use of computing resources, inaccuracy of dialog system responses, and so forth. Accordingly, users need to manually activate dialog systems every time they want to make a request. This may be very annoying and inconvenient for the users. Additionally, the need for manual reactivation of dialog systems does not allow the dialog systems to be user friendly and keep human-like speech conversations, which significantly limits their application.

SUMMARY

This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

The present disclosure relates to embodiments of a dialog system and a method of its operation, which overcome at least some drawbacks of prior art systems. In particular, the embodiments provide for a speech acquiring mode for a dialog system that can be manually activated/deactivated and automatically activated/deactivated. The embodiments provide for a feature allowing for automatically reactivating the speech acquiring mode after the dialog system has delivered a response to a user request. The reactivation is intelligent in terms of its dependence from a number of predetermined criteria, rules, and/or conversation scenarios. In some conversation scenarios, the reactivation is performed with a delay, which may depend on a number of factors. In other conversation scenarios, the reactivation is intentionally suppressed based upon a type of a request or response delivered by the dialog system. It yet other conversation scenarios, the reactivation can last for a predetermined period of time, which may be also intelligently selected based on a number of factors. These and other embodiments are further summarized in the following aspects of the present disclosure. These aspects, however, are not intended to limit the scope of the subject matter.

According to an aspect of the embodiments of present disclosure, a method is provided for operating of a dialog system. The method can be implemented by means of a computing device having one or more processors and a memory in association with the one or more processors. The method comprises the steps of activating a speech acquiring mode, receiving a first input of a user, deactivating the

speech acquiring mode, obtaining a first response associated with the first input, delivering the first response to the user, determining that a conversation mode is activated, and, based on the determination, automatically re-activating the speech acquiring mode within a first predetermined time period after delivering of the first response to the user.

In certain embodiments, the first input of the user may comprise a speech-based input. The first input of the user may also comprise a text-based input. In certain embodiments, the method may further comprise the steps of receiving a second input of the user, obtaining a second response associated with the second input, and delivering the second response to the user. Further, the method may comprise the step of deactivating the speech acquiring mode after receiving of the second input of the user based on an instruction from a remote server or a type of response.

In certain embodiments, the method may further comprise the steps of determining that a voice activation mode is deactivated and, based on the determination that that the voice activation mode is deactivated, the step of delivering the first response to the user may comprise displaying a displayable message associated with the first response to the user.

In yet more embodiments, the conversation mode may enable the computing device to record the first input of the user. The conversation mode may also enable the computing device to recognize the first input of the user. The conversation mode may also enable the computing device to transmit the first input of the user to a remote server.

In certain embodiments, the method may further comprise the steps of recognizing the first input of the user to generate a first recognized input and generating the first response to the recognized input. In certain embodiments, the method may further comprise the step of selecting the first predetermined time period depending on a type of the first input of the user. In certain embodiments, the method may further comprise the step of selecting the first predetermined time period depending on a type of the first response. In certain embodiments, the method may further comprise the step of selecting the first predetermined time period depending on a length of the first response. The first predetermined time period can be fixed between 1 and 10 seconds.

In certain embodiments, the method may further comprise the steps of setting an automatic recognition flag to the first response based on a type of the first response or a type of the first input and suppressing the speech acquiring mode based on the automatic recognition flag. The first response may comprise metadata, which set the first predetermined time period. The speech acquiring mode can be re-activated for a second predetermined time period. In yet more embodiments, the first response may comprise metadata, which may set the second time period. The step of activating of the speech acquiring mode may be performed in response to determining an activation of an actionable button by the user.

According to another aspect of the embodiments of the present disclosure, a dialog system is provided. The dialog system may comprise a speech recognition module configured to receive a first user input, recognize at least a part of the first user input, and generate a first recognized input, when the speech recognition module is in a speech acquiring mode. The dialog system may further comprise a dialog manager configured to activate and deactivate the speech acquiring mode, and to generate a first response to the first recognized input. The dialog system may comprise a user output module configured to deliver the first response to a user. The dialog manager is further configured to automatically re-activate the speech acquiring mode within a first predetermined time period after delivering of the first response to the user, when a conversation mode is activated.

According to yet another aspect of the embodiments of the present disclosure, a non-transitory processor-readable medium having instructions stored thereon is provided. The instructions, when executed by one or more processors, may cause the one or more processors to implement a method for operating of a dialog system. The method may comprise the steps of activating a speech acquiring mode, receiving a first input of a user, deactivating the speech acquiring mode, obtaining a first response associated with the first input, delivering the first response to the user, determining that a conversation mode is activated, and, based on the determination, automatically re-activating the speech acquiring mode within a first predetermined time period after delivering of the first response to the user.

In further example embodiments and aspects, modules, systems, subsystems, or devices can be adapted to perform the recited method steps. Other features and exemplary embodiments are described below.

BRIEF DESCRIPTION OF DRAWINGS

Embodiments are illustrated by way of example and not limitation in the figures of the accompanying drawings, in which like references indicate similar elements and in which:

FIG. **1** shows a high-level flow diagram of a general process for user interaction with an exemplary spoken dialog system.

FIG. **2** shows a high level architecture of an exemplary spoken dialog system.

FIG. **3** shows a high-level block diagram illustrating an example user device suitable for implementing the methods described herein.

FIG. **4** shows a high-level block diagram of an example system environment suitable for practicing the present technologies.

FIG. **5** shows a high-level block diagram of another example system environment suitable for practicing the present technologies.

FIG. **6** shows a schematic diagram of a graphical user interface with chat features for an exemplary user device.

FIG. **7** shows a schematic diagram of another graphical user interface with chat features for an exemplary user device.

FIG. **8** shows a schematic diagram of yet another graphical user interface with settings features for an exemplary user device.

FIG. **9** shows a process flow diagram showing a method for activation of speech acquiring mode.

FIG. **10** shows a process flow diagram showing a method for dialog system operation.

FIG. **11** shows a process flow diagram showing a first conversation scenario.

FIG. **12** shows a process flow diagram showing a second conversation scenario.

FIG. **13** shows a process flow diagram showing a third conversation scenario.

FIG. **14** shows a process flow diagram showing a fourth conversation scenario.

FIG. **15** shows a process flow diagram showing a fifth conversation scenario.

DETAILED DESCRIPTION

In this document, the terms “a” or “an” are used, as is common in patent documents, to include one or more than

one. In this document, the term "or" is used to refer to a nonexclusive "or," such that "A or B" includes "A but not B," "B but not A," and "A and B," unless otherwise indicated.

The following detailed description includes references to the accompanying drawings, which form a part of the detailed description. The drawings show illustrations in accordance with example embodiments. These example embodiments, which are also referred to herein as "examples," are described in enough detail to enable those skilled in the art to practice the present subject matter. The embodiments can be combined, other embodiments can be utilized, or structural, logical and electrical changes can be made without departing from the scope of what is claimed. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope is defined by the appended claims and their equivalents.

The techniques of the embodiments disclosed herein may be implemented using a variety of technologies. For example, the methods described herein may be implemented in software executing on a computer system or in hardware utilizing either a combination of microprocessors or other specially designed application-specific integrated circuits (ASICs), programmable logic devices, or various combinations thereof. In particular, the methods described herein may be implemented by a series of computer-executable instructions residing on a storage medium such as a disk drive, or computer-readable medium. It should be noted that methods disclosed herein can be implemented by a computer (e.g., a desktop computer, tablet computer, laptop computer), game console, handheld gaming device, cellular phone, smart phone, smart television system, and so forth.

INTRODUCTION

As outlined above, embodiments of the present disclosure provide for a dialog system having the feature for intelligent reactivating of a speech acquiring mode depending on a number of factors and conversation scenarios. These embodiments will now be described with reference to figures of the accompanying drawings.

FIG. **1** shows a high-level flow diagram **100** of a general process for user interaction with an exemplary spoken dialog system. In general, the user may interact with the dialog system utilizing a user device selected from a wide range of electronic devices including, for example, a computer (desktop computer, laptop computer, tablet computer), smart phone, cellular phone, game console, game pad, remote controller, television device, smart (Internet) television device, audio system, in-vehicle computer system, infotainment system, or any other suitable electronic device. The interaction with the dialog system may include speech commands, although key input commands, selection of actionable (clickable) messages, or gesture-based commands are also possible. As described below in greater detail, the dialog system may refer to a software mobile application installed on the user device, a server, or a remote device, or it may refer to a distributed application or a cloud-based service.

As shown in FIG. **1**, the user may commence interaction with the exemplary spoken dialog system at operation **110** with activating a speech acquiring mode. This mode activates the dialog system to receive user requests such as spoken or typed questions or commands. The speech acquiring mode is typically activated by pressing a dedicated button, which is usually shown as a microphone image. Notably, the speech acquiring mode is activated temporally (e.g., specifically for the time period required to record a user oral request).

Accordingly, at operation **120**, the user provides a speech-based (audio) user input (e.g., using one or more microphones). The user input may refer to an information request, such as "What is the weather like today?", or a speech command such as to send a text message or the like. Once the user completes his request or command, the speech acquiring mode is deactivated and the dialog system may start its processing.

At operation **130**, an automatic speech recognizer (ASR) of the dialog system may recognize the user input so as to translate spoken words, phrases, and sentences into text, which is referred herein to as a recognized input. The recognized input is then analyzed at operation **140** by a natural language processing (NLP) module (for example, morphological analysis, part-of-speech tagging, or shallow parsing can be performed). The NLP module may also map the recognized input or its parts to one or more meaning representations (e.g., semantic frame) from which the dialog act, user goal, and named entities are extracted by a semantic parser or statistical model.

At operation **150**, a dialog manager generates an output (response) based at least in part on the recognized input and located meaning representations. For example, the dialog manager may retrieve specific information from one or more resources (e.g., electronic calendar, database, website, remote or local resources, remote or local services, etc.). At operation **160**, the output is provided to the user. Generally, the output can be delivered in the form of text, image, audio, or video message. For these ends, an output renderer may be utilized, which may transform text into speech and provide the output as a machine-generated audio signal. Alternatively, the output may be presented as a text message and shown on a display of the user device.

The process illustrated by diagram **100** can be performed cyclically. More specifically, if the user wants to keep a conversation with the dialog system open and provide an additional request or clarify anything in response to the dialog system output, the speech acquiring mode needs to be re-activated so as to complete the operations **110-160**. The embodiments of the present disclosure enable automatically re-activating the speech acquiring mode depending on a number of factors. Among such factors are a type or parameter of first user request, type or parameter of dialog system response, and a conversation scenario, to name a few. Notably, the re-activation can be delayed for a time period after the operation **160** is completed, with the time period being predetermined or intelligently selected based on the above factors or other criteria. Moreover, the speech acquiring mode can be activated for another time period, which, again, can be predetermined (e.g., 1 to 10 seconds) or intelligently selected based on the above factors or other criteria. Accordingly, this feature enables the user to keep the conversation with the dialog system in a natural manner, which is much less time consuming and annoying, especially when the user needs to manually reactivate the speech acquiring mode or the dialog system itself.

System Architecture

The above given user interaction process is further illustrated in FIG. **2**, which shows a high level architecture of exemplary spoken dialog system **200**, according to an example embodiment. It should be noted that every module of the dialog system **200** or associated architecture includes hardware components, software components, or a combination thereof. The dialog system **200** may be embedded or

installed in the user device or server, or may be presented as a cloud computing module and/or a distributed computing module.

In the embodiment shown, the dialog system **200** includes an ASR **210** configured to receive and process speech-based user inputs into a sequence of parameter vectors. The ASR **210** further converts the sequence of parameter vectors into a recognized input (i.e., a textual input having one or more words, phrases, or sentences). The ASR **210** includes one or more speech recognizers such as a pattern-based speech recognizer, free-dictation recognizer, address book based recognizer, dynamically created recognizer, and so forth.

Further, the dialog system **200** includes a NLP module **220** for understanding spoken language input. Specifically, the NLP module **220** may disassemble and parse the recognized input to produce utterances, which are then analyzed utilizing, for example, morphological analysis, part-of-speech tagging, shallow parsing, and the like, and then map recognized input or its parts to meaning representations.

The dialog system **200** further includes a dialog manager **230**, which coordinates the activity of all components, controls dialog flows, and communicates with external applications, devices, services or resources. The dialog manager **230** may play many roles, which include discourse analysis, knowledge database query, and system action prediction based on the discourse context. In some embodiments, the dialog manager **230** may contact one or more task managers (not shown) that may have knowledge of specific task domains. In some embodiments, the dialog manager **230** may communicate with various computing, logic, or storage resources **240**, which may include, for example, a content storage, rules database, recommendation database, push notification database, electronic address book, email or text agents, dialog history database, disparate knowledge databases, map database, points of interest database, geographical location determiner, clock, wireless network detector, search engines, social networking websites, blogging websites, news feeds services, and many more. The dialog manager **230** may employ multiple disparate approaches to generate outputs in response to recognized inputs. Some approaches include the use of statistical analysis, machine-learning algorithms (e.g., neural networks), heuristic analysis, and so forth. The dialog manager **230** is one of the central components of dialog system **200**. The major role of the dialog manager **230** is to select the correct system actions based on observed evidences and inferred dialog states from the results of NLP (e.g., dialog act, user goal, and discourse history). In addition, the dialog manager **230** should be able to handle errors when the user input has ASR and NLP errors caused by noises or unexpected inputs.

The dialog system **200** may further include an output renderer **250** for transforming the output of the dialog manager **230** into a form suitable for providing to the user. For example, the output renderer **250** may employ a text-to-speech engine or may contact a pre-recorded audio database to generate an audio message corresponding to the output of the dialog manager **230**. In certain embodiments, the output renderer **250** may present the output of the dialog manager **230** as a text message, an image, or a video message for further displaying on a display screen of the user device.

FIG. **3** is a high-level block diagram illustrating an example user device **300** suitable for implementing the methods described herein. It is worth mentioning that all components of the user device **300** may include logic elements, hardware components, software (firmware) components, virtual components, or a combination thereof. The user device **300** may include, be, or be an integral part of one or more of a variety of types of devices and systems such as a general-purpose computer, desktop computer, server, computer network, network service, and cloud computing service, among others. Further, all modules shown in FIG. **3** may be operatively coupled using any suitable wired, wireless, radio, electrical, or optical standards. As already outlined above, the user device **300** may refer to a smart phone, wireless telephone, and computer, such as a tablet computer, desktop computer, infotainment system, in-vehicle computing device, to name a few.

As shown in FIG. **3**, the user device **300** includes the following hardware components: one or more processors **302**, memory **304**, one or more storage devices **306**, one or more input modules **308**, one or more output modules **310**, network interface **312**, and optional geo location determiner **314**. The user device **300** also includes the following software or virtual components: an operating system **320**, dialog system **200**, rules database **330**, and user profile/settings database **340**. The dialog system **200** provides a human-centric interface for accessing and managing information as discussed herein.

The processor(s) **302** is(are), in some embodiments, configured to implement functionality and/or process instructions for execution within the user device **300**. For example, the processor(s) **302** may process instructions stored in memory **304** and/or instructions stored on storage devices **306**. Such instructions may include components of an operating system **320** and dialog system **200**. The user device **300** may also include one or more additional components not shown in FIG. **3**, such as a housing, power supply, and communication bus, among others. These elements are omitted not to burden the description of the present embodiments.

Memory **304**, according to one example embodiment, is configured to store information within the user device **300** during operation. Memory **304**, in some example embodiments, may refer to a non-transitory computer-readable storage medium or a computer-readable storage device. In some examples, memory **304** is a temporary memory, meaning that a primary purpose of memory **304** may not be long-term storage. Memory **304** may also refer to a volatile memory, meaning that memory **304** does not maintain stored contents when memory **304** is not receiving power. Examples of volatile memories include random access memories (RAM), dynamic random access memories (DRAM), static random access memories (SRAM), and other forms of volatile memories known in the art. In some examples, memory **304** is used to store program instructions for execution by the processors **302**. Memory **304**, in one example embodiment, is used by software (e.g., the operating system **320**) or dialog system **200**, executing on user device **300** to temporarily store information during program execution. One or more storage devices **306** can also include one or more transitory or non-transitory computer-readable storage media and/or computer-readable storage devices. In some embodiments, storage devices **306** may be configured to store greater amounts of information than memory **304**. Storage devices **306** may further be configured for long-term storage of information. In some examples, the storage devices **306** include non-volatile storage elements. Examples of such non-volatile storage elements include magnetic hard discs, optical discs, solid-state discs, flash memories, forms of electrically programmable memories (EPROM) or electrically erasable and programmable memories, and other forms of non-volatile memories known in the art.

Still referencing FIG. **3**, the user device **300** includes one or more input modules **308**. The input modules **308** are configured to receive user inputs. Examples of input modules **308** include a microphone, keyboard, keypad, mouse, trackball, touchscreen, touchpad, or any other device capable of detecting an input from a user or other source in the form of speech, audio, or tactile actions, and relaying the input to the user device **300** or components thereof. The output modules **310**, in some example embodiments, are configured to provide output to users through visual or auditory channels. Output modules **310** may include a video graphics adapter card, liquid crystal display (LCD) monitor, light emitting diode (LED) monitor, sound card, speaker, or any other device capable of generating output that may be intelligible to a user.

The user device **300**, in certain example embodiments, includes network interface **312**. The network interface **312** can be utilized to communicate with external devices, servers, and networked systems via one or more communications networks such as one or more wired, wireless, or optical networks including, for example, the Internet, intranet, local area network (LAN), wide area network (WAN), cellular phone networks (e.g. Global System for Mobile (GSM) communications network, packet switching communications network, circuit switching communications network), Bluetooth radio, and an IEEE 802.11-based radio frequency network, among others. The network interface **312** may be a network interface card, such as an Ethernet card, optical transceiver, radio frequency transceiver, or any other type of device that can send and receive information. Other examples of such network interfaces may include Bluetooth®, 3G, 4G, and WiFi® radios in mobile computing devices as well as Universal Serial Bus (USB).

The user device **300** may further include a geo location determiner **314** for determining a current geographical location of the user device. The geo location determiner **314** may utilize a number of different methods for determining geographical location including, for example, receiving and processing signals of Global Positioning Systems (GPS), GLONASS satellite navigation systems, or the Galileo satellite navigation system; utilizing multilateration of radio signals between radio towers (base stations); or utilizing geolocation methods associated with Internet Protocol (IP) addresses, Media Access Control (MAC) addresses, Radio-Frequency Identification (RFID), or other technologies.

The operating system **320** may control one or more functionalities of user device **300** or components thereof. For example, the operating system **320** may interact with the dialog system **200**, rules database **330**, and user profile/settings database **340**, and may further facilitate one or more interactions between elements **200**, **330**, **340** and one or more of processors **302**, memory **304**, storage devices **306**, input modules **308**, and output modules **310**. As shown in FIG. **3**, the operating system **320** may interact with or be otherwise coupled to the dialog system **200** and components thereof. In some embodiments, the dialog system **200** can be included into the operating system **320**. Notably, the user device **300** and its components, such as the dialog system **200**, may also interact with one or more remote storage or computing resources including, for example, web resources, web sites, social networking websites, blogging websites, news feeds, email servers, web calendars, event databases, ticket aggregators, map databases, points of interest databases, and so forth.

In certain embodiments, the rules database **330**, which can be optional in many designs, includes one or more of the following: rules, program codes, instructions, parameters, specifications, and other data to enable the dialog system to operate in a designed way. The user profile/settings database **340**, which can also be optional in many designs, includes user profiles, personalized settings, user preferences, user data, and so forth. In other words, the dialog system **200** may operate relying on instructions stored in the rules database **330** and/or user preferences set in the user profile/settings database **340**.

FIG. **4** shows a high-level block diagram of an example system environment **400** suitable for practicing the present technologies. The system environment **400** includes a user device **300** having a dialog system **200** and databases **330**, **340** installed therein. There is also provided a communications network **410** allowing the user device **300** to communicate with one or more web resources and/or web services **420**.

In this example embodiment, the processing of user requests is performed solely using hardware and software/virtual components of the user device **300** itself. The user device **300** may, however, communicate with the web resources and/or web services **420** in order to obtain requested information or perform a requested action.

FIG. **5** shows a high-level block diagram of another example system environment **500** suitable for practicing the present technologies. More specifically, this embodiment refers to a distributed system environment or cloud-based system environment, where a user device **300** serves a client, and the dialog system **200** and the databases **330**, **340** are in a networked server(s).

In this example, the user device **300** is configured to receive or capture user audio inputs (e.g., via one or more microphones) or tactile based inputs and deliver them to the dialog system **200** via a communications network **410**. Once the user input is processed and a response is generated, it is delivered from the dialog system **200** to the user device **300** via the communications network **410**. Once the response is received, the user device **300** simply plays back or displays it.

The web resources and/or web services **420** shown in FIGS. **4**, **5** refer one or more of the following: webpages, websites, Internet search engines, databases, data storage, data aggregators (e.g., ticket aggregators), file sharing websites, e-mail servers, e-mail services, instant messaging services, social networking websites, blogging websites, micro-blogging websites, news services, news Rich Site Summaries (RSS), map services, online banking services, online calendar services, online appointment scheduling services, location determining services, weather services, time services, Application Programming Interfaces (APIs), and so forth. Notably, the dialog system **200** and its components are configured to operatively communicate with these or similar web resources and/or web services **420** to exchange data depending on a particular application and user request. For example, the dialog system **200** may communicate with the at least one web resource and/or web service **420** so as to generate responses to user inputs (e.g., to retrieve/download weather information). In another example, the dialog system **200** may communicate with the at least one web resource and/or web service **420** so as to identify triggering events (e.g., identifying a new status of the user's friend via at least one social networking site). In yet another embodiment, the recommendation manager may communicate with the at least one web resource and/or web service **420** so as to generate one or more dialog recommendations for the user (e.g., communicating with a map service to identify points of interests located near a current location of the user or provide navigation).

Graphical User Interface

FIG. **6** illustrates a schematic diagram of a graphical user interface **600** with chat features for an exemplary user device **300** shown in the form of a wireless telephone with a touchscreen. It worth mentioning that the same or similar graphical user interface **600** may be provided for a desktop or laptop computer, tablet computer, or any other suitable device.

Generally, the user interface **600** is the first screen displayable when the user starts the operation of the dialog system **200**. In the example embodiment shown, the user interface **600** includes a container **610** (may also refer to a window widget or output element) where an avatar **620** is displayed. Optionally, the user can select an avatar of his preference or construct it from disparate elements (e.g., select clothes, eyes, hair, etc.).

The user interface **600** also includes a number of actionable (clickable) buttons including a microphone button **630**, a settings button **640**, and a speaker button **650**. The microphone button **630**, when pressed by a user, manually activates a speech acquiring mode of a dialog system. In this mode, the user device **300** records user speech inputs or allows the user to make an input using a keypad. Typically, the mode is active as long as the user makes an input, and once the input is completed, the speech acquiring mode can be automatically or manually deactivated. After its deactivation, the dialog system **200** starts processing the recorded input to generate a corresponding answer. That said, if the user wants to make a request to the dialog system **200**, he needs to press the microphone button **630**, provide an input, and wait for a response.

In certain embodiments, a first press on the microphone button **630** activates the speech acquiring mode, while a secondary press on the microphone button **630** deactivates the speech acquiring mode and/or cancels just made user input. In some embodiments, there may be also provided a cancellation button (not shown) enabling the user to stop or cancel a current action/mode performed by the dialog system **200**.

Still referencing FIG. **6**, the setting button **640**, when pressed by the user, brings a settings user interface **800** shown in FIG. **8**. The setting interface enables the user to adjust parameters of the dialog system **200**, establish or edit his profile, create or edit specific rules and criteria, and so forth. In one example, the user may activate or deactivate a conversation mode. Generally, the conversation mode enables the dialog system **200** to keep conversations with the user by automatically re-activating the speech acquiring mode in certain time instances.

Further, the speaker button **650** controls the method of delivering dialog system responses to the user. Namely, this button enables a user to select whether a responses are provided as audio messages through a speaker or as displayable messages only.

Notably, the graphical user interface **600** may include other containers, widgets, icons, or buttons such as a button to manually activate or deactivate the conversation mode. Moreover, in certain embodiments, the user may also activate or interact with the user interface **600** by actuating traditional buttons present on the user device (e.g., a "main menu" button **660** or a key pad). In yet other embodiments, the user may activate or interact with the user interface **600** by giving a gesture based command

FIG. **7** illustrates a schematic diagram of another graphical user interface **700** with chat features for an exemplary user device **300** shown in the form of a wireless telephone with a touchscreen. Generally, the user interface **700** is a screen displayable to the user after the dialog system **200** processed at least one user input.

In particular, the user interface **700** includes the container **610** with the avatar **620**, clickable buttons (i.e., the microphone button **630**, settings button **640** and speaker button **650**), and also a container **710**. The container **710** is used for displaying messages (i.e., text, image, or video based messages) generated by the dialog system **200**. As shown in FIG. **7**, the container **710** may display a user input **730** in the form of a text message after it was input by the user using a keyboard or after it was spoken and recognized by the dialog system **200**. Further, the container **710** may show a response **720** of the dialog system **200** to a particular user input such as the user input **730**. Similarly, the response **720** can be in the text message. Notably, the container **710** may display multiple user inputs and multiple dialog system responses, one after another, to reflect a conversation of the user with the dialog system **200**.

FIG. **8** illustrates a schematic diagram of yet another graphical user interface being a settings user interface **800** with settings features for an exemplary user device **300** shown in the form of a wireless telephone with a touchscreen. The settings user interface **800** enables the user to manage the operation of the dialog system, create and edit user profile and parameters/rules associated thereto, and activate/deactivate disparate features and modes.

In the example shown, there are the following control buttons or radio buttons: "Conversation Mode" radio button **810**, "Voice Activation" radio button **820**, "Voice Settings" clickable button **830**, and "Customization" clickable button **840**. More specifically, "Conversation Mode" radio button **810** enables the user to manually activate or deactivate the conversation mode. When this mode is activated, the dialog system keeps the dialog with the user by automatically re-activating the speech acquiring mode after a response is delivered to the user and when certain predetermined criteria are met. "Voice Activation" radio button **820** enables the user to activate or deactivate the mode of voice activation (i.e. "wake-up") of the dialog system. For example, the dialog system may be activated (i.e. "woken up") after the user says a phrase, such as 'Hay, Assistant!' "Voice Settings" clickable button **830** enables the user to set characteristics for presenting audio message (e.g., to select a voice). Finally, "Customization" clickable button **840** enables the user to customize his profile, specific rules or parameters of the dialog system, and so forth. Some or all of the settings can be stored in the user profile/settings database **340** for further reference by the dialog system **200**.

Operation Methods

This section of the document provides multiple examples of operation methods. First, with reference to FIGS. **9** and **10**, there are described generalized operation methods of dialog system **200**, and further, with reference to FIGS. **11-15**, there are provided more specific examples (i.e., conversation scenarios).

FIG. **9** is a process flow diagram showing a method **900** for activation of speech acquiring mode, according to an example embodiment. The method **900** may be performed by processing logic that may comprise hardware (e.g., decision making logic, dedicated logic, programmable logic, and microcode), software (such as software run on a general-purpose computer system or a dedicated machine), or a combination of both. In one example embodiment, the processing logic refers to the dialog system **200** or its components. In other words, the method **900** can be performed by various components discussed above with reference to FIGS. **2-5**. Notably, the below recited steps of

method **900** may be implemented in an order different than described and shown in FIG. **9**. Moreover, the method **900** may have additional steps not shown herein, but which can be evident for those skilled in the art from the present disclosure. The method **900** may also have fewer steps than outlined below and shown in FIG. **9**.

As shown in the figure, the process commences at the decision block **910**, when the dialog system **200** determines whether or not a voice activation mode is activated. The step can be performed each time when the dialog system **200** is started or after the dialog system **200** just delivered a response to a user request. If it is determined that the voice activation mode is not activated by the user, the method **900** proceeds to the step **920**, which instructs the dialog system **200** that a speech acquiring mode shall not be automatically activated after a response is delivered to the user. Otherwise, if it is determined that the voice activation mode is already activated by the user in settings, the method **900** proceeds to the step **930**, which instructs the dialog system **200** to determine whether or not the conversation mode is activated.

If it is determined that the conversation mode is not activated by the user, the method **900** proceeds to the step **940**, which instructs the dialog system **200** to determine whether or not a previously delivered response includes metadata with an "automatic recognition" flag with a "true" value. If it is determined that the "automatic recognition" flag does not have a "true" value (i.e., it has "false" value), the method **900** proceeds to the step **920**, which instructs the dialog system **200** that the speech acquiring mode shall not be automatically activated after a response is delivered to the user. Otherwise, if it is determined that the "automatic recognition" flag has the "true" value, the method **900** proceeds to the step **950**, which instructs the dialog system **200** that the speech acquiring mode shall be automatically re-activated after a response is delivered to the user.

If in the step **930** it is determined that the conversation mode was activated by the user, the method **900** proceeds to the step **960**, which instructs the dialog system **200** to determine whether or not a previously delivered response includes metadata with a "automatic recognition" flag having a "false" value. If it is determined that the "automatic recognition" flag in the metadata indeed has the "false" value, the method **900** proceeds to the step **920**, which instructs the dialog system **200** that the speech acquiring mode shall not be automatically activated after a response is delivered to the user. Otherwise, if it is determined that the "automatic recognition" flag does not have the "false" value (i.e., it has "true" value), the method **900** proceeds to the step **970**, which instructs the dialog system **200** to determine whether or not a previously delivered response has a suppression instruction (for example, it is determined if a previously delivered response includes a dedicated instruction to suppress the speech acquiring mode). Accordingly, if it is determined that a previously delivered response included a suppression instruction, the method **900** proceeds to the step **920**, which instructs the dialog system **200** that the speech acquiring mode shall not be automatically activated after a response is delivered to the user. Otherwise, if it is determined that a previously delivered response did not include a suppression instruction, the method **900** proceeds to the step **920**, which instructs the dialog system **200** that the speech acquiring mode shall be automatically re-activated after a response is delivered to the user.

FIG. **10** is a process flow diagram showing a method **1000** for operation of a dialog system according to an example embodiment. The method **1000** may be performed by processing logic that may comprise hardware (e.g., decision making logic, dedicated logic, programmable logic, and microcode), software (such as software run on a general-purpose computer system or a dedicated machine), or a combination of both. In one example embodiment, the processing logic refers to the dialog system **200** or its components. In other words, the method **1000** can be performed by various components discussed above with reference to FIGS. **2-5**. It should be also appreciated that the method **1000** is just one example operation of the dialog system **200**. In addition, the below recited steps of method **1000** may be implemented in an order different than described and shown in FIG. **10**. Moreover, the method **1000** may have additional steps not shown herein, but which can be evident for those skilled in the art from the present disclosure. The method **1000** may also have fewer steps than outlined below and shown in FIG. **10**.

The method **1000** starts at operation **1010** with activating a speech acquiring mode of the dialog system **200**. This can be done manually by pressing the microphone button **630** or when the dialog system **200** is started, e.g. by the a user tap or by an activation word or an activation phrase, a user opening push message, a reminder, a notification, and so forth. In an example embodiment, a 'listed upon startup' option may be active for a microphone, according to which the microphone may be activated upon the start ('wake up') of the dialog system **200**. Once the speech acquiring mode is activated, the user is invited to provide an oral request. Accordingly, at operation **1020**, the dialog system **200** receives a first input of the user and the speech acquiring mode is deactivated. In some embodiments, while the speech acquiring mode is active, the dialog system **200** or the user device **300** records the user input, but after the speech acquiring mode is deactivated the recorded user input is processed by the dialog system **200**.

Still referencing FIG. **10**, at operation **1030**, the dialog system **200** processes the first input, and then obtains and delivers a first response to the first input. In one example embodiment, the delivery of the first response can include presenting an audio message to a user via a speaker or headphones of the user device **300**. In another example embodiment, the delivery of the first response can include presenting a displayable message on a display of the user device **300**, and the message can include text, image, video, or any other displayable content. In yet more embodiments, the response can be delivered as both an audio message and displayable message.

Further, at operation **1040**, the dialog system **200** determines that a conversation mode is activated. As mentioned above, the conversation mode can be enabled by the user in the settings user interface **800**. At operation **1050**, based on the determination, the dialog system **200** automatically re-activates the speech acquiring mode within a first predetermined time period after delivering of the first response to the user. In an example embodiment, the dialog system **200** may determine whether the mode (when the dialog system responses are presented in the form of audio messages in addition to displayable messages) is activated ('mute off' mode) or deactivated ('mute on' mode). In the 'mute off' mode, the activation of the speech acquiring mode is done immediately after the dialog system **200** finishes speaking (unless there is an instruction to do otherwise). In the 'mute on' mode, a plurality of predetermined rules may be used to determine how much time is needed for the user to read/understand the first response (e.g., if graphics are presented in the first response).

In one example embodiment, the first predetermined time period is fixed. For example, the first predetermined time period may be anywhere between 0.1 second to 20 seconds, but more preferably it is between 1 second and 10 seconds. In one instance, it can be 2 seconds, but in another instance it can be 5 seconds depending on other factors.

In another embodiment, the first predetermined time period is dynamically selected or determined based on predetermined criteria or rules. For example, the first predetermined time period may depend on a type of first user input. In another example, the first predetermined time period may depend on a type of first response delivered to the user (e.g., when a response relates to reading of an email, the first predetermined time period may be longer in contrast than when a response relates to reading of current weather parameters). In yet another example, the first predetermined time period may depend on a length of the first response delivered to the user. The length may be determined by a number of words or letters in the response, although other complexity criteria can be employed. For example, if the response is less than 10 words long, the first predetermined time period can be just 1 second; if the response is between 10 and 20 words, the first predetermined time period is 3 seconds; if the response is between 20 and 30 words, the first predetermined time period is 5 seconds, and so forth. It should be clear that the first predetermined time period may depend on a number of factors and predetermined rules pre-selected for certain conversation scenarios. In yet more embodiments, the first predetermined time period can be set by metadata associated with the response.

Notably, the speech acquiring mode is re-activated for a second predetermined time period, when the dialog system **200** awaits and records the next user input. Similarly to above, the second predetermined time period may depend on a number of factors. For example, in one example embodiment, the second predetermined time period is fixed. It can be anywhere between 1 second to 20 seconds, but more preferably it is between 1 second and 10 seconds. In some examples, the second predetermined time period can be set by metadata associated with the response. In yet another example embodiment, the second predetermined time period is dynamically selected or determined based on disparate predetermined criteria or rules. For example, the second predetermined time period may depend on a type of first user input. In another example, the second predetermined time period may depend on a type of first response delivered to the user. In another example, the second predetermined time period may depend on a length of the first response delivered to the user. The length may be determined by a number of words or letters in the response, although other complexity criteria can be employed. It should be clear that the second predetermined time period may depend on a number of factors and predetermined rules pre-selected for certain conversation scenarios.

Still referencing to FIG. **10**, at operation **1060**, the dialog system **200** receives a second input of the user and deactivates the speech acquiring mode (which was activated at the operation **1040**). Similarly to above, at operation **1070**, the dialog system **200** obtains and delivers a second response associated with the second input of the user.

Accordingly, the operations of method **1000** may be cyclically repeated over and over again so that the user may experience a natural language conversation with the dialog system **200**. The use of first and second predetermined time periods allows the dialog system **200** to intelligently expect when a next user request will be made to provide the most natural dialog interaction experience to the user, and without excessive consumption of computational and power resources.

As already outlined above, in certain embodiments, the response of the dialog system **200** may include metadata, which may include additional instructions, for example, in the form of the automatic recognition flag. This flag can be used to initiate recognition if the flag true or forcefully suppress the re-activation of the speech acquiring mode after the response is delivered to the user. In other embodiments, the metadata may set the first and/or second predetermined time periods equal to zero. In this case, the user will not be able to provide an input without manual reactivation of the speech acquiring mode.

In some additional embodiments, metadata may also include additional instructions setting emotional characteristics to a corresponding response to be delivered to the user. The emotional characteristics may relate to the appearance of the avatar **620** and/or tone, voice, intonation, volume or other parameters of the audio message associated with the dialog system response.

In other embodiments, metadata may also include instructions to certain hardware or software resources of the user device **300**. For example, there may be instructions to acquire current geographical location of the user, store or retrieve certain data to the user profile, and so forth.

Conversation Scenarios

Scenario 1

This exemplary conversation scenario illustrates automatic activation of the speech acquiring mode after a response is delivered to a user. In this scenario, the voice activation mode is activated and a conversation mode is also activated (e.g., through the settings user interface **800**).

FIG. **11** is a process flow diagram showing a first conversation scenario method **1100** according to an example embodiment. Similar to above, the method **1100** can be performed by one or more components of the dialog system **200** and/or the user device **300**. Notably, the method **1100** may have additional steps or may have fewer steps than shown, and the order of the steps may differ from that shown.

At step **1110**, a user presses the microphone button **630** to activate the speech acquiring mode. At step **1120**, the user provides an input and the dialog system **200** acquires, recognizes, and processes the user input. At step **1130**, the dialog system **200** generates and delivers a response to the user. At step **1140**, the dialog system **200** automatically re-activates the speech acquiring mode within a first predetermined time period and for a second predetermined time period.

Scenario 2

This exemplary conversation scenario illustrates temporary suppressing of the conversation mode upon input using a keyboard. In this scenario, the voice activation mode is activated and a conversation mode is also activated (e.g., through the settings user interface **800**).

FIG. **12** is a process flow diagram showing a second conversation scenario method **1200** according to an example embodiment. Similar to above, the method **1200** can be performed by one or more components of the dialog system **200** and/or the user device **300**. Notably, the method **1200** may have additional steps or may have fewer steps than shown, and the order of the steps may differ from that shown.

At step **1210**, a user makes a first input to the dialog system **200** using a keyboard or touchscreen. At step **1220**, the dialog system **200** acquires and processes the first input.

At step **1230**, the dialog system **200** generates and delivers a response to the first input in the form of an audio and/or text message. Further, the user may make a second input. If the second input is in a text form (e.g., when the user uses the keyboard), the dialog system **200** does not activate the speech acquiring mode. Otherwise, if the second input is in a speech form, the dialog system **200** activates the speech acquiring mode and further processing is performed in accordance with Scenario 1.

Scenario 3

This exemplary conversation scenario illustrates suppression of the speech acquiring mode based on a dialog system response. In this scenario, the voice activation mode is activated and a conversation mode is also activated (e.g., through the settings user interface **800**).

FIG. **13** is a process flow diagram showing a third conversation scenario method **1300** according to an example embodiment. Similar to above, the method **1300** can be performed by one or more components of the dialog system **200** and/or the user device **300**. Notably, the method **1300** may have additional steps or may have fewer steps than shown, and the order of the steps may differ from that shown.

At step **1310**, a user presses the microphone button **630** to activate the speech acquiring mode. At step **1320**, the user provides an input and the dialog system **200** acquires, recognizes, and processes the user input. At step **1330**, the dialog system **200** generates and delivers a response to the user. The response includes metadata having the "automatic recognition" flag with the "false" value. At step **1340**, the dialog system **200** does not automatically re-activate the speech acquiring mode as prescribed by the metadata.

Scenario 4

This exemplary conversation scenario illustrates automatic activation of the speech acquiring mode based on a dialog system response. In this scenario, the voice activation mode is activated and a conversation mode is not activated (e.g., through the settings user interface **800**).

FIG. **14** is a process flow diagram showing a fourth conversation scenario method **1400** according to an example embodiment. Similar to above, the method **1400** can be performed by one or more components of the dialog system **200** and/or the user device **300**. Notably, the method **1400** may have additional steps or may have fewer steps than shown, and the order of the steps may differ from that shown.

At step **1410**, a user presses the microphone button **630** to activate the speech acquiring mode. At step **1420**, the user provides an input and the dialog system **200** acquires, recognizes, and processes the user input. At step **1430**, the dialog system **200** generates and delivers a response to the user. The response includes metadata having the "automatic recognition" flag with the "true" value. At step **1440**, the dialog system **200** automatically re-activates the speech acquiring mode within a first predetermined time period and for a second predetermined time period.

Scenario 5

This exemplary conversation scenario illustrates operation of the dialog system when the speech acquiring mode is not activated due to suppression based on a suppression instruction. Accordingly, in this scenario, the voice activation mode is not activated and a conversation mode is also not activated (e.g., through the settings user interface **800**).

FIG. **15** is a process flow diagram showing a fifth conversation scenario method **1500**, according to an example embodiment. Similar to above, the method **1500** can be performed by one or more components of the dialog system **200** and/or the user device **300**. Notably, the method **1500** may have additional steps or may have fewer steps than shown, and the order of the steps may differ from that shown.

At step **1510**, a user provides an input using a keyboard or touchscreen. At step **1520**, the dialog system **200** acquires and processes the user input. At step **1530**, the dialog system **200** generates and delivers a response to the user in the form of displayable message only, for example, opening a webpage, launching an application, initiating media playback, and so forth. At step **1540**, the dialog system **200** does not automatically re-activate the speech acquiring mode.

Thus, the dialog system and method of its operation have been described. Although embodiments have been described with reference to specific example embodiments, it will be evident that various modifications and changes can be made to these example embodiments without departing from the broader spirit and scope of the present application. Accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense.

What is claimed is:

1. A method for operating of a dialog system, the method comprising:

activating, by means of a computing device comprising one or more processors and a memory, a speech acquiring mode;

receiving, by means of the computing device, a first input of a user;

deactivating, by means of the computing device, the speech acquiring mode;

obtaining, by means of the computing device, a first response associated with the first input;

delivering, by means of the computing device, the first response to the user;

determining, by means of the computing device, that a conversation mode is activated;

selecting, by means of the computing device, a first predetermined time period based on a number of words in the first response; and

based on the determination that the conversation mode is activated, automatically re-activating, by means of the computing device, the speech acquiring mode within the first predetermined time period after delivery of the first response to the user.

2. The method of claim **1**, wherein the first input of the user comprises a speech-based input.

3. The method of claim **1**, wherein the first input of the user comprises a text-based input.

4. The method of claim **1**, further comprising:

receiving, by means of the computing device, a second input of the user;

obtaining, by means of the computing device, a second response associated with the second input; and

delivering, by means of the computing device, the second response to the user.

5. The method of claim **4**, further comprising deactivating, by means of the computing device, the speech acquiring mode after receiving of the second input of the user.

6. The method of claim **1**, further comprising:

determining, by means of the computing device, that a voice activation mode is activated; and

based on the determination that that the voice activation mode is activated, the delivering of the first response to the user comprising providing, by means of the computing device, an audio message associated with the first response to the user.

7. The method of claim 1, further comprising:

determining, by means of the computing device, that a voice activation mode is deactivated; and

based on the determination that that the voice activation mode is deactivated, the delivering of the first response to the user comprising displaying, by means of the computing device, a displayable message associated with the first response to the user.

8. The method of claim 1, wherein the conversation mode enables the computing device to record the first input of the user.

9. The method of claim 1, wherein the conversation mode enables the computing device to recognize the first input of the user.

10. The method of claim 1, wherein the conversation mode enables the computing device to transmit the first input of the user to a remote server.

11. The method of claim 1, further comprising:

recognizing, by means of the computing device, the first input of the user to generate a first recognized input;

generating, by means of the computing device, the first response to the recognized input.

12. The method of claim 1, further comprising selecting, by means of the computing device, the first predetermined time period based on a type of the first response, wherein the type of the first response varies depending on a text provided in the first response.

13. The method of claim 1, wherein the first predetermined time period is fixed between 1 and 10 seconds.

14. The method of claim 1, further comprising:

setting, by the computing device, an automatic recognition flag to the first response based on a type of the first response or a type of the first input; and

suppressing, by the computing device, the speech acquiring mode based on the automatic recognition flag.

15. The method of claim 1, wherein the first response comprises metadata, wherein the metadata sets the first predetermined time period.

16. The method of claim 1, wherein the speech acquiring mode is re-activated for a second predetermined time period.

17. The method of claim 16, wherein the first response comprises metadata, wherein the metadata includes instructions to cause the dialog system to set the second predetermined time period based on the metadata.

[18. A dialog system, the system comprising:

a speech recognition module configured to receive a first user input and recognize at least a part of the first user input and generate a first recognized input, when the speech recognition module is in a speech acquiring mode;

a dialog manager configured to activate and deactivate the speech acquiring mode, and to generate a first response to the first recognized input;

a user output module configured to deliver the first response to a user; and

wherein the dialog manager is further configured to select a first predetermined time period based on a number of words in the first response and automatically re-activate the speech acquiring mode within the first predetermined time period after delivering of the first response to the user, when a conversation mode is activated.]

19. A non-transitory processor-readable medium having instructions stored thereon, which when executed by one or more processors, cause the one or more processors to implement a method for operating of a dialog system, the method comprising:

activating a speech acquiring mode;

receiving a first input of a user;

deactivating the speech acquiring mode;

obtaining a first response associated with the first input;

delivering the first response to the user;

determining that a conversation mode is activated;

select a first predetermined time period based on a number of words in the first response; and

based on the determination that the conversation mode is activated, automatically re-activating the speech acquiring mode within the first predetermined time period after delivering of the first response to the user.

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