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(54) Title: EVOLUTION OF A USER INTERFACE BASED ON LEARNED IDIOSYNCRASIES AND COLLECTED DATA OF A USER

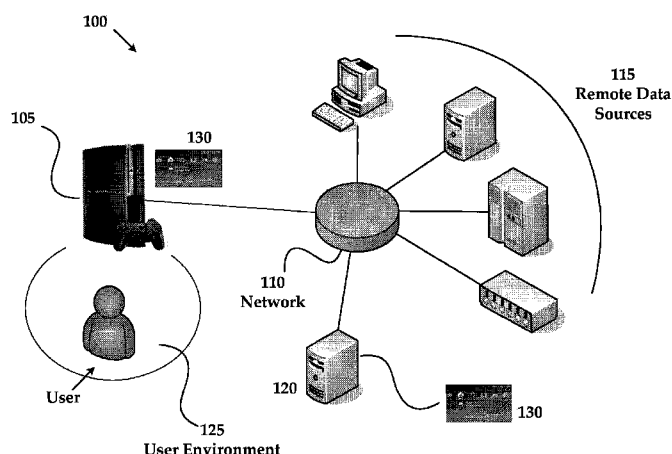


FIGURE 1

(57) Abstract: A user interface evolves based on learned idiosyncrasies and collected data of a user. Learned idiosyncrasies and collected data of the user can be stored in a knowledge base. Information from the surrounding environment of the user can be obtained during learning of idiosyncrasies or collection of data. Thought-based statements can be generated based at least in part on the knowledge base and the information from the environment surrounding the user during learning of idiosyncrasies or collection of data. The thought-based statements serve to invoke or respond to subsequent actions of the user. The user interface can be presented so as to allow for interaction with the user based at least in part on the thought-based statements. Furthermore, personality nuances of the user interface can be developed that affect the interaction between the user and the user interface.

EVOLUTION OF A USER INTERFACE BASED ON LEARNED IDIOSYNCRASIES AND COLLECTED DATA OF A USER

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention generally relates to user interfaces. More specifically, the present invention relates to providing an intelligent user interface that evolves based on learned idiosyncrasies and collected data of a user.

Description of the Related Art

A user interface is an aggregate of means by which people-users-interact with a system such as a particular machine, device, computer program, or other complex tool. The user interface provides means of input and output. The input means allow the user to manipulate the system, while the output means allow the system to indicate the effects of the user manipulation. The design of a user interface affects the amount of effort a user must expend to provide input for the system and to interpret output of the system. Usability is the degree to which the design of a particular user interface takes into account the human psychology and behavioral characteristics of the users, and makes the process of using the system effective, efficient and satisfying.

Current user interfaces are, at best, minimally personalized. Generally, these user interfaces are available with factory-set defaults that are selected with the general population or another large user group in mind. Users maybe provided with the option of changing certain preferences; however any preference changes will be limited to a predefined list thereof. Furthermore, any customized behavior of these user interfaces must be specifically programmed by the user or otherwise. Given these and other limitations with current user interfaces, what is needed is a user interface that evolves in various aspects during use based on characteristics, habits, and other data associated with a user.

SUMMARY OF THE CLAIMED INVENTION

Embodiments of the present invention allow an intelligent user interface to be provided that evolves based on learned idiosyncrasies and collected data of a user.

In a claimed embodiment, a method is set forth for providing a user interface that evolves based on learned idiosyncrasies and collected data of a user. Learned idiosyncrasies and collected data of the user are stored in a knowledge base. Instructions stored in memory are executed to obtain information from the surrounding environment of the user during learning of idiosyncrasies or collection of data. Instructions stored in memory are executed to generate thought-based statements based at least in part on the knowledge base and the information from the environment surrounding the user during learning of idiosyncrasies or collection of data. The thought-based statements serve to invoke or respond to subsequent actions of the user. Instructions stored in memory are executed to

present the user interface and to allow for interaction with the user based at least in part on the thought-based statements.

Another claimed embodiment sets forth a system for providing a user interface that evolves based on learned idiosyncrasies and collected data of a user. The system includes a knowledge base, a sensory engine, a thought engine, and an interaction engine, all of which are stored in memory. The knowledge base is configured to store learned idiosyncrasies and collected data of the user. The sensory engine is executable to obtain information from the surrounding environment of the user during learning of idiosyncrasies or collection of data. The thought engine is executable to generate thought-based statements based at least in part on the knowledge base and the information from the environment surrounding the user during learning of idiosyncrasies or collection of data. The thought-based statements serve to invoke or respond to subsequent actions of the user. The interaction engine is executable to present the user interface and to allow for interaction with the user based at least in part on the thought-based statements.

A computer-readable storage medium is set forth in yet another claimed embodiment. A program is embodied on the computer-readable storage medium, which is executable by a processor to perform a method for providing a user interface that evolves based on learned idiosyncrasies and collected data of a user. The method includes storing learned idiosyncrasies and collected data of the user in a knowledge base, obtaining information from the surrounding environment of the user during learning of idiosyncrasies or collection of data, generating thought-based statements based at least in part on the knowledge base and the information from the environment surrounding the user during learning of idiosyncrasies or collection of data, and presenting the user interface and to allow for interaction with the user based at least in part on the thought-based statements. The thought-based statements serve to invoke or respond to subsequent actions of the user.

BRIEF DESCRIPTION OF THE FIGURES

FIGURE 1 illustrates an environment for providing an intelligent user interface that evolves based on learned idiosyncrasies and collected data of a user.

FIGURE 2 is a block diagram of an exemplary intelligent user interface system that may be invoked in the environment illustrated in FIGURE 1.

FIGURE 3 is a block diagram of an exemplary sensory engine that may be included in the intelligent user interface system.

FIGURE 4 is a block diagram of an exemplary thought engine that may be included in the intelligent user interface system.

FIGURE 5 is a block diagram of an exemplary interaction engine that may be included in the intelligent user interface system.

FIGURE 6 is a collection of exemplary avatars that may be included in the intelligent user interface.

FIGURE 7 is a block diagram of an exemplary personality engine that may be included in the intelligent user interface system.

FIGURE 8 is a flowchart illustrating an exemplary method for providing an intelligent user interface that evolves based on learned idiosyncrasies and collected data of a user.

FIGURE 9 is a block diagram illustrating an exemplary device that may be used to implement an embodiment of the present invention.

DETAILED DESCRIPTION

Embodiments of the presently disclosed invention allow an intelligent user interface to be provided that evolves based on learned idiosyncrasies and collected data of a user. As the user interacts with the intelligent user interface, idiosyncrasies of the user such as habits and rituals will be learned. Additionally, data associated with the user will be collected from local and remote sources. Examples of local data include a catalog of user media or services available to a system presenting the user interface. Examples of remote data include an index of information from third-party accounts associated with the user or textual communication by the user. Further information can be obtained through interactive dialog with the user in which the user explicitly or implicitly provides the information through verbal input.

The sum of obtained information associated with the user—both local and remote—can be stored in a regularly-updated knowledge base and be used to generate thought-based statements. The thought-based statements serve to invoke or respond to subsequent actions of the user. Though this iterative process of "getting to know" the user, the user interface evolves to better satisfy the wants and needs of the user.

FIGURE 1 illustrates an environment **100** for providing an intelligent user interface that evolves based on learned idiosyncrasies and collected data of a user. As depicted, the environment **100** includes a user device **105** in communication with a network **110**. Remote data sources **115** and an optional server **120** are also in communication with the network **110**. The network **110** facilitates communication between the user device **105**, the remote data sources **115**, the server **120**, and other devices communicatively coupled with the network **110**. The user device **105**, the remote data sources **115**, and the server **120** include the requisite network interfaces, memory, and processing components as may be required to interact with one another via the network **110**. User environment **125** includes an area that surrounds the user device **105** and a user thereof. Such an area could, for example, be a living room.

Both the user device **105** and the server **120** are shown as including an intelligent user interface system **130**, however, the user interface system **130** may reside entirely in one device or may be distributed across two or more networked devices. The intelligent user interface system **130** is described in further detail in connection with FIGURE 2. Environment **100** may include many devices such as the user device **105** and the server **120** in communication via the network **110**.

The user device **105** can facilitate presentation of an intelligent user interface by way of the intelligent user interface system **130**. While the user device **105** is depicted in FIGURE 1 as housing the intelligent user interface system **130**, the user device **105** may access via the network **110** an instance of the intelligent user interface **130** residing on a remote computer such as the server **120**. Similarly, the user device **105** may execute certain components of the intelligent user interface system **130** locally and access other components remotely via the network **110**.

The user device **105** may include any portable consumer electronics device such as a smart phone, portable media playback device, or gaming device. Examples of the user device **105** include portable gaming devices such as a PSP™ and PSP Go from Sony Computer Entertainment Inc. The user device **105** may also include car stereos, e-book readers, and portable computers. The user device **105** may include one or more integrated output devices for presenting media or may also allow for an external coupling to the same (*e.g.*, a display and speakers).

The user device **105** may also include any consumer electronics not specifically designed for portability. Examples of the user device **105** include a home entertainment system such as the PlayStation®3 available from Sony Computer Entertainment Inc. or more limited game hardware platforms of a different albeit inferior manufacture than those offered by Sony Computer Entertainment. Further examples of consumer electronics devices include various home theater components such as a Digital Versatile Disc (DVD) player, a Blu-Ray Disc player, a Digital Video Recorder, set-top cable boxes, and personal computers. The user device **105** may include one or more integrated output devices for presenting media or be coupled to the same.

The remote data sources **115** include any third-party server or database. Third-party servers may host services such as email and instant messaging services, banks and other financial institutions, social-networking websites, news sources, RSS feeds, and other websites. The remote data sources **115** can also include other devices similar to the user device **105**.

The environment **100** can optionally include the server **120**. The server **120** can store data associated with an instance of the intelligent user interface system **130** residing on the user device **105**. The server **120** can also include the intelligent user interface system **130** to facilitate generation of an intelligent user interface to be presented by the user device **105**. In such a case, the user device **105** may access an instance of the intelligent user interface system **130** being executed by the server **120** via the network **110**. Furthermore, the server **120** can execute certain components of the intelligent user interface system **130** locally, while other components are executed by the user device **105**.

FIGURE 2 is a block diagram of the exemplary intelligent user interface system **130** that may be invoked in the environment **100** illustrated in FIGURE 1. As illustrated in FIGURE 2, the intelligent user interface system **130** includes a knowledge base **205**, a user data aggregation engine **210**, a sensory engine **215**, a thought engine **220**, an interaction engine **225**, and a personality engine **230**. The individual program components and applications making up engines and modules of the

intelligent user interface system 130 may be stored in memory of devices such as the user device 105 or the server 120. The intelligent user interface system 130 and its constituent engines and modules can be executed by a processor to effectuate respective functionalities attributed thereto. The intelligent user interface system 130 may be composed of more or fewer engines/modules or combinations of the same and still fall within the scope of the present invention. For example, the functionalities of the interaction engine 225 and the functionalities of the personality engine 230 may be combined into a single engine or module.

The knowledge base **205** can be a database that is configured to store learned idiosyncrasies and collected data of the user. Generally, learned idiosyncrasies are descriptive of individualizing qualities or characteristics of a particular user. The learned idiosyncrasies may account for certain eccentricities or peculiarities by identified habits and rituals of the user. Collected data of the user can encompass any information associated with the user. For example, collected data can include various facts about the user such as who they are, where they come from, and what they are interested in. The collected data may also include an index of user data stored locally or remotely such as game data, browser history, social network profile data, contacts, calendar events, media files, and so forth. Such learned idiosyncrasies and collected data may be regularly obtained by other constituent components of the intelligent user interface system **130** such that the knowledge base **205** is kept up to date. The learned idiosyncrasies and collected data stored by the knowledge base **205** can be accessed by other constituent component of the intelligent user interface system **130**.

The user data aggregation engine **210** is executable to update the knowledge base **205** with information associated with the user. Updating the knowledge base may include cataloging local data associated with a user such as locally stored media and calendar events. Collecting remote data associated with the user such as memberships and purchase information may also be part of updating the knowledge base **205**. The user data aggregation engine **210** can also be executed to record information associated with verbal input received from the user and to track acts performed by the user to determine user idiosyncrasies.

The sensory engine **215** can be executed to obtain information from the user environment **125** during learning of idiosyncrasies and/or collection of data. Examples of such information include visual or audible information. By being coupled to a microphone or array of microphones and/image sensing device or camera, data concerning the user environment **125** may be collected and processed by the sensory engine **215**. This information could include the sound of a door opening at a particular time of day, which would indicate a user arriving home whereby the system may then engage in the offering of thought-based statements (e.g., "welcome home"). Camera data such as an image of the user could likewise invoke a thought-based statement conversation particular to a given user or conversation specific to a particular time of day based on light levels (e.g., "good evening"). The position of a user in the room or with respect to an input gathering device or in the real-world in general may be gathered using GPS, triangulation, cellular base station, or other location based

information. Location information may be derived from other sources not traditionally associated with location identification but nevertheless indicative of the same (e.g., a debit card charge at a restaurant having a particular restaurant). The sensory engine 215 is described in further detail in connection with FIGURE 2.

Execution of the thought engine 220 can generate thought-based statements based at least in part on the knowledge base 205 and the information from the user environment 125 obtained through execution of the sensory engine 215. The thought-based statements serve to invoke or respond to subsequent actions of the user. An example of a thought-based statement might be "welcome home, would you like me to play some music" or "it is currently 6 PM, would you like me to suggest a restaurant for dinner?" The thought engine 220 is described in further detail in connection with FIGURE 4.

The interaction engine 225 is executable to present an intelligent user interface and to allow for interaction with the user based at least in part on the thought-based statements generated through execution of the thought engine 220. The intelligent user interface can include a number of form factors. For example, the intelligent user interface may present a visual image of face such that the interaction is akin to having a conversation with another real person. The interface could also be a character including a real-person (e.g., an avatar generated to appear similar to that of a person or randomly generated persona), a cartoon character (e.g., Homer Simpson), an animal (e.g., a talking dog) or other object (e.g., a blinking eye or giant lips). The interface could also be a touch screen, menu, or other data entry mechanism. The interaction engine 225 is described in further detail in connection with FIGURE 5.

The personality engine 230 can be executed to develop personality nuances of the intelligent user interface that affect the interaction between the user and the intelligent user interface. Such personality nuances may include a particular sense of humor, inside knowledge of the user, an inside joke, a particular tone, and facial expressions. The personality engine 230 is described in further detail in connection with FIGURE 8.

FIGURE 3 is a block diagram of the exemplary sensory engine 215 that may be included in the intelligent user interface system 130. As mentioned in connection with FIGURE 2, the sensory engine 215 can be executed to obtain information from the user environment 125 during learning of idiosyncrasies and/or collection of data. The sensory engine 215, as illustrated in FIGURE 3, includes a speech module 305, a sight module 310, a sound module 315, and a position module 320. The individual program components and applications making up modules of the sensory engine 215 may be stored in memory of devices such as the user device 105 or the server 120. The constituent modules of the sensory engine 215 can be executed by a processor to effectuate respective functionalities attributed thereto. The sensory engine 215 may be composed of more or fewer modules or combinations of the same and still fall within the scope of the present invention.

The speech module 305 can be executed to decipher detected speech from the user. The module 305 may utilize Hidden Markov Models (HMM). HMM output a sequence of symbols or quantities. The speech signal can be viewed as a piecewise stationary signal or a short-time stationary signal whereby speech can be approximated as a stationary process allowing the speech to be thought of as a Markov model for stochastic processes. HMMs are popular in that they can be trained automatically and are simple and computationally feasible to use. The speech module 305 may also use Viterbi algorithms, acoustic and language model information, finite state transducers, and other speech recognition techniques.

The sight module 310 is executable to optically detect a body part of the user. For example, the sight module 310 can be executed to detect a hand of the user in order to detect a manual gesture. The sight module 310 may also be executed to detect the face of the user such as to perform facial recognition.

In the latter example, a facial recognition algorithm may identify faces by extracting landmarks, or features, from an image of the subject's face such as the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw. These features are then used to search for other images with matching features. Other algorithms normalize a gallery of face images and then compress the face data, only saving the data in the image that is useful for face detection; a probe image is then compared with the face data. Recognition algorithms can generally be divided into the geometric, which look at distinguishing features or photometric, which is a statistical approach that distills an image into values and comparing the values with templates to eliminate variances. Other techniques include three-dimensional recognition that uses 3-D sensors to capture information about the shape of a face to identify distinctive features and skin texture analysis, which uses the visual details of the skin and turns the unique lines, patterns, and spots into a mathematical space.

Optical information of the user environment 125 can be obtained using a camera communicatively coupled or integral with the user device 105, as described in connection with FIGURE 9.

Execution of the sound module 315 allows a response to an audio signal in the user environment 125 to be provided. Audio signals in the user environment 125 can be detected using a microphone integral or communicatively coupled with the user device 105, as described in connection with FIGURE 9. For example, the sound module 315 might identify a sudden sound against a previously existing background of silence as might occur with the opening of a door in a previously empty room. That sound might indicate the presence of a user.

The position module 320 can be executed to determine the location and/or motion of the user. Positional information indicative of the location and motion of the user can be obtained through GPS and other triangulation techniques, including base stations. For example, GPS information can be obtained using a GPS device communicatively coupled or integral with the user device 105, as described in connection with FIGURE 9.

FIGURE 4 is a block diagram of the exemplary thought engine 220 that may be included in the intelligent user interface system 130. As mentioned in connection with FIGURE 2, the thought engine can be executed to generate thought-based statements based at least in part on the knowledge base 205 and the information from the user environment 125 obtained through execution of the sensory engine 215. As illustrated in FIGURE 4, the thought engine 220 includes an information evaluation module 405, a thought formation module 410, and a thought prioritization module 415. The individual program components and applications making up modules of the thought engine 220 may be stored in memory of devices such as the user device 105 or the server 120. The constituent modules of the thought engine 220 can be executed by a processor to effectuate respective functionalities attributed thereto. The thought engine 220 may be composed of more or fewer modules or combinations of the same and still fall within the scope of the present invention.

The information evaluation module 405, when executed, evaluates all or some portion of available information associated with the user. This can entail evaluation of the knowledge base 205 as well as the information from the user environment 125 obtained through execution of the sensory engine 215. Evaluation module 405 aggregates all available information relevant to a particular scenario to generate parameters that might drive a subsequent thought based statement generated by the thought formation module 410. Evaluation module 405 may access knowledge base 205 to recognize certain patterns of behavior in light of current sensory information. For example, if the knowledge base 205 reflects that a particular user arrives home Monday through Friday at approximately 5:30 PM, the presence of sound corresponding to an opening door at 5.24 PM on a Thursday may similarly indicate the arrival of that user. With that information having been recognized by evaluation module 405, the thought formation module 410 may then formulate an appropriate thought statement. Evaluation module 405 may similarly recognize that two users typically arrive home at the same time and require additional information such as recognizing the voice of a user or processing image information of the user. In this way, the thought formation module 410 may then generate the appropriate greeting (e.g., "Hello, Will" or "Hello, Holly").

The thought formation module 410 can be executed to formulate the thought-based statements in response to an evaluation of the knowledge base 205 and the information from the user environment 125 as undertaken by evaluation module 405. The thought-formation module 410 may then issue appropriate thought-based statements such as "Good evening, Will" when clock time indicates that it is 5:30 PM and Will typically arrives home at 5:30, a camera having processed image data confirming that Will is, in fact, home rather than his roommate or girlfriend. Similarly, the thought formation module 410 may recognize, in light of parameters from the evaluation module 405, that any of those three persons might have entered into the room and issue a more generic greeting such as "Good evening, who has arrived home?" in order to prompt an informative response from the user-that response also being processed by evaluation module 405.

The thought prioritization module 415 is executable to prioritize the thought-based statements based on importance. For example, the prioritization module 415 may indicate that of three thought-based statements identified as being appropriate for the arrival of a user into the room at 5:30 PM on a Friday (as indicated by parameters generated by the evaluation module 405) that "Good evening, welcome home" should be rendered before statements such as "would you like me to make a dinner suggestion?" or "would you like me to play some music?" If the entering user states, "thank you, I'm hungry, any suggestions for dinner" in response to the "welcome home greeting," then the prioritization module may indicate that the next based statement should be "would you like me to make a dinner suggestion?" rather than inquiring as to music and launching a library of available music or even inquiring into a particular song or artist. Prioritization is dependent upon the context of any given situation and history related to that situation as determined by the evaluation module 405.

FIGURE 5 is a block diagram of the exemplary interaction engine 225 that may be included in the intelligent user interface system 130. As mentioned in connection with FIGURE 2, the interaction engine 225 can be executed to present an intelligent user interface and to allow for interaction with the user based at least in part on the thought-based statements generated through execution of the thought engine 220. The interaction engine 225 depicted in FIGURE 5 includes an action module 505, a reaction module 510, an interactive conversation module 515, and an optional avatar module 520. The individual program components and applications making up modules of the interaction engine 225 may be stored in memory of devices such as the user device 105 or the server 120. The constituent modules of the interaction engine 225 can be executed by a processor to effectuate respective functionalities attributed thereto. The interaction engine 225 may be composed of more or fewer modules or combinations of the same and still fall within the scope of the present invention.

The action module 505 is executable to perform actions based on the thought-based statements. For example, if a thought-based statement suggests the playing of music, the action module 505 may launch a music library and indicate available songs and artists. Similarly, if a statement suggests restaurants, a map may be launched indicating location, reviews, or means for making a reservation.

The reaction module 510 can be executed to perform reactions to information obtained from the user environment 125. If camera data indicates that the light level in the room has dipped, the reaction module 510 can trigger the activation of room lighting if the system is coupled to a light management system. Similarly, if sound volume dips in the room, then the volume associated with music being played by the system will also dip to avoid it being too loud. In another example, if the phone rings (as indicated by the detected sound of a ringer or through a VOIP connection coupled to the system), the reaction module 510 may pause playback of a movie or game and result in the generation of a thought based statement inquiring as to whether the call should be answered.

The interactive conversation module 515 is executable to provide verbal responses to verbal input by the user. For example, if a user requests music, then the interactive conversation module 515 may respond, "I'd be happy to comply-is there a particular type of music you would like to listen to?" By working in conjunction with other modules and the knowledge base 205, the interactive conversation module 515 may determine that a user likes a particular genre of music on particular days or at particular times and suggest playback of that particular genre in a similar situation.

Execution of the optional avatar module 520 allows presentation of an avatar to the user as a part of the intelligent user interface. FIGURE 6 is a collection of exemplary avatars that may be included in the intelligent user interface. Any number of the aforementioned modules may interact with other modules to provide a conversational, almost human, interactive experience.

FIGURE 7 is a block diagram of the exemplary personality engine 230 that may be included in the intelligent user interface system 130. As mentioned in connection with FIGURE 2, the personality engine 230 can be executed to develop personality nuances of the intelligent user interface that affect the interaction between the user and the intelligent user interface. As illustrated in FIGURE 7, the personality engine 230 includes a conversation analysis module 705, an experience analysis module 710, a goals module 715, and a desires module 720. The individual program components and applications making up modules of the personality engine 230 may be stored in memory of devices such as the user device 105 or the server 120. The constituent modules of the personality engine 230 can be executed by a processor to effectuate respective functionalities attributed thereto. The personality engine 230 may be composed of more or fewer modules or combinations of the same and still fall within the scope of the present invention.

The conversation analysis module 705 can be executed to analyze past verbal input by the user. The generated thought-based statements may be based in part the analysis of the past verbal input. For example, certain statements ("I had a lousy day") may be indicative of mood or present feeling, which may be used to present certain options if similar conversational interactions are identified in the future.

The experience analysis module 710 is executable to analyze past interactions between the user and the user device 105. The generated thought-based statements can be based in part on the analysis of the past interactions. For example, a logic tree might be developed that indicates a particular flow of conversation results in a particular set of discussion options (e.g., an inquiry as to food leads to offering up a suggestion, which then leads to type of food, followed by proximity, and ultimately the availability of reservations or take out).

Execution of the goals module 715 allows formation of goals of the intelligent user interface. The generated thought-based statements may be based in part on the goals. The goals module 715 may, for example, work in conjunction with other modules to identify an ultimate result to be generated from a conversation. For example, if a user inquires as to dinner suggestions, the goals module 715 may recognize that it ultimately needs to find a restaurant that is open, within driving

distance (or some other parameter, which may in and of itself be a goal), of a particular type of food and have reservations for a particular number of people at a particular time. AS a result of recognizing these goals, the requisite thought-based statements may be generated as to generate the appropriate responsive answers. What constitutes a goal for any given conversation may be recognized over time from information gathered by the knowledge based 205.

The desires module 720 can be executed to form desires of the intelligent user interface. The generated thought-based statements can be based in part on the desires. For example, if the system recognizes that a user is in a bad mood, then desires module 720 may seek to arrive at some end result that cheers up the user. This may involve suggesting a particular activity, television show, or contacting a friend by phone. Like all modules of the present system, interaction with other modules and data sources may be necessary to properly identify a state of mind or being of a user and that a particular desire or goal is appropriate.

FIGURE 8 is a flowchart illustrating an exemplary method 800 for providing an intelligent user interface that evolves based on learned idiosyncrasies and collected data of a user. The steps of the method 800 may be performed in varying orders. Furthermore, steps may be added or subtracted from the method 800 and still fall within the scope of the present technology. The methodology illustrated in FIGURE 8 may be embodied on a computer-readable storage medium and executable by a processing device at anyone of the devices illustrated in FIGURE 1.

In step 805, learned idiosyncrasies and collected data of the user are stored in the knowledge base 205. Step 805 can be performed in conjunction with execution of the user data aggregation engine 210.

In step 810, information is obtained from the surrounding environment of the user (*e.g.*, the user environment 125) during learning of idiosyncrasies or collection of data. Step 810 can be performed by way of execution of the sensory engine 215.

In step 815, thought-based statements are generated based at least in part on the knowledge base 205 and the information from the environment surrounding the user during learning of idiosyncrasies or collection of data. As mentioned herein, the thought-based statements serve to invoke or respond to subsequent actions of the user. The thought engine 220 can be executed to perform step 815.

In step 820, the user interface is presented and interaction with the user is allowed therewith based at least in part on the thought-based statements. Step 820 can be performed through execution of the interaction engine 225.

In step 825, personality nuances of the user interface are developed that affect the interaction between the user and the user interface. The personality engine 230 can be executed to perform step 825.

FIGURE 9 is a block diagram illustrating an exemplary device 900 that may be used to implement an embodiment of the present technology. The device 900 may be implemented in the

contexts of the likes of the user device 105 and the server 120. The device 900 of FIGURE 9 includes one or more processors 910 and main memory 920. Main memory 920 stores, in part, instructions and data for execution by processor 910. Main memory 920 can store the executable code when in operation. The device 900 of FIGURE 9 further includes a mass storage device 930, portable storage medium drive(s) 940, output devices 950, user input devices 960, a graphics display 970, and peripheral devices 980.

The components shown in FIGURE 9 are depicted as being connected via a single bus 990. The components may be connected through one or more data transport means. The processor unit 910 and the main memory 920 may be connected via a local microprocessor bus, and the mass storage device 930, peripheral device(s) 980, portable storage device 940, and display system 970 may be connected via one or more input/output (I/O) buses.

Mass storage device 930, which may be implemented with a magnetic disk drive or an optical disk drive, is a non-volatile storage device for storing data and instructions for use by processor unit 910. Mass storage device 930 can store the system software for implementing embodiments of the present invention for purposes of loading that software into main memory 920.

Portable storage device 940 operates in conjunction with a portable non-volatile storage medium, such as a floppy disk, compact disk, digital video disc, or USB storage device, to input and output data and code to and from the device 900 of FIGURE 9. The system software for implementing embodiments of the present invention may be stored on such a portable medium and input to the device 900 via the portable storage device 940.

Input devices 960 provide a portion of a user interface. Input devices 960 may include an alpha-numeric keypad, such as a keyboard, for inputting alpha-numeric and other information, or a pointing device, such as a mouse, a trackball, stylus, or cursor direction keys. Additionally, the device 900 as shown in FIGURE 9 includes output devices 950. Suitable output devices include speakers, printers, network interfaces, and monitors.

Display system 970 may include a liquid crystal display (LCD) or other suitable display device. Display system 970 receives textual and graphical information, and processes the information for output to the display device.

Peripherals 980 may include any type of computer support device to add additional functionality to the computer system. Peripheral device(s) 980 may include a modem, a router, a camera, a microphone, and a GPS receiver. Peripheral device(s) 980 can be integral or communicatively coupled with the device 900.

The components contained in the device 900 of FIGURE 9 are those typically found in computing systems that may be suitable for use with embodiments of the present invention and are intended to represent a broad category of such computing components that are well known in the art. Thus, the device 900 of FIGURE 9 can be a home entertainment system, personal computer, handheld computing device, telephone, mobile computing device, workstation, server, minicomputer,

mainframe computer, or any other computing device. The device 900 can also include different bus configurations, networked platforms, multi-processor platforms, etc. Various operating systems can be used including Unix, Linux, Windows, Macintosh OS, Palm OS, webOS, Android, iPhone OS, and other suitable operating systems.

It is noteworthy that any hardware platform suitable for performing the processing described herein is suitable for use with the technology. Computer-readable storage media refer to any medium or media that participate in providing instructions to a central processing unit (CPU), a processor, a microcontroller, or the like. Such media can take forms including, but not limited to, non-volatile and volatile media such as optical or magnetic disks and dynamic memory, respectively. Common forms of computer-readable storage media include a floppy disk, a flexible disk, a hard disk, magnetic tape, any other magnetic storage medium, a CD-ROM disk, digital video disk (DVD), any other optical storage medium, RAM, PROM, EPROM, a FLASHEPROM, any other memory chip or cartridge.

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. The descriptions are not intended to limit the scope of the technology to the particular forms set forth herein. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above-described exemplary embodiments. It should be understood that the above description is illustrative and not restrictive. To the contrary, the present descriptions are intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the technology as defined by the appended claims and otherwise appreciated by one of ordinary skill in the art. The scope of the technology should, therefore, be determined not with reference to the above description, but instead should be determined with reference to the appended claims along with their full scope of equivalents.

CLAIMS**WHAT IS CLAIMED IS:**

1. A method for providing a user interface that evolves based on learned idiosyncrasies and collected data of a user, the method comprising:
 - storing learned idiosyncrasies and collected data of the user in a knowledge base;
 - executing instructions stored in memory to obtain information from the surrounding environment of the user during learning of idiosyncrasies or collection of data;
 - executing instructions stored in memory to generate thought-based statements based at least in part on the knowledge base and the information from the environment surrounding the user during learning of idiosyncrasies or collection of data, the thought-based statements serving to invoke or respond to subsequent actions of the user; and
 - executing instructions stored in memory to present the user interface and to allow for interaction with the user based at least in part on the thought-based statements.
2. The method of claim 1, wherein executing instructions to obtain the information from the surrounding environments includes deciphering detected speech from the user.
3. The method of claim 1, wherein executing instructions to obtain the information from the surrounding environments includes optically detecting a body part of the user.
4. The method of claim 3, wherein optically detecting the body part includes detecting a manual gesture.
5. The method of claim 3, wherein optically detecting the body part includes performing facial recognition.
6. The method of claim 1, wherein executing instructions to obtain the information from the surrounding environment includes determining one or more of the location of the user or motion of the user.
7. The method of claim 1, wherein executing instructions to obtain the information from the surrounding environments includes providing a response to an audio signal in the surrounding environment of the system.
8. The method of claim 1, wherein executing instructions to generate the thought-based statements includes prioritizing the thought-based statements based on importance.

9. The method of claim 1, wherein the user interface includes an avatar.

10. The method of claim 1, further comprising executing instructions stored in memory to develop personality nuances of the user interface that affect the interaction between the user and the user interface.

11. The method of claim 10, wherein executing instructions to develop the personality nuances includes analyzing past verbal input by the user, wherein the generated thought-based statements are further based on the analysis of the past verbal input.

12. The method of claim 10, wherein executing instructions to develop the personality nuances includes analyzing past interactions between the user and the system, wherein the generated thought-based statements are further based on the analysis of the past interactions.

13. The method of claim 10, wherein executing instructions to develop the personality nuances includes forming desires of the intelligent user interface, wherein the generated thought-based statements are further based on the desires.

14. The method of claim 10, wherein executing instructions to develop the personality nuances includes forming goals of the intelligent user interface, wherein the generated thought-based statements are further based on the goals

15. A system for providing a user interface that evolves based on learned idiosyncrasies and collected data of a user, the system comprising:

a knowledge base configured to store learned idiosyncrasies and collected data of the user;

a sensory engine stored in memory and executable to obtain information from the surrounding environment of the user during learning of idiosyncrasies or collection of data;

a thought engine stored in memory and executable to generate thought-based statements based at least in part on the knowledge base and the information from the environment surrounding the user during learning of idiosyncrasies or collection of data, the thought-based statements serving to invoke or respond to subsequent actions of the user; and

an interaction engine stored in memory and executable to present the user interface and to allow for interaction with the user based at least in part on the thought-based statements.

16. The system of claim 15, further comprising a personality engine stored in memory and executable to develop personality nuances of the user interface that affect the interaction between the user and the user interface.

17. A computer-readable storage medium having a program embodied thereon, the program executable by a processor to perform a method for providing a user interface that evolves based on learned idiosyncrasies and collected data of a user, the method comprising:

storing learned idiosyncrasies and collected data of the user in a knowledge base;

obtaining information from the surrounding environment of the user during learning of idiosyncrasies or collection of data;

generating thought-based statements based at least in part on the knowledge base and the information from the environment surrounding the user during learning of idiosyncrasies or collection of data, the thought-based statements serving to invoke or respond to subsequent actions of the user; and

presenting the user interface and to allow for interaction with the user based at least in part on the thought-based statements.

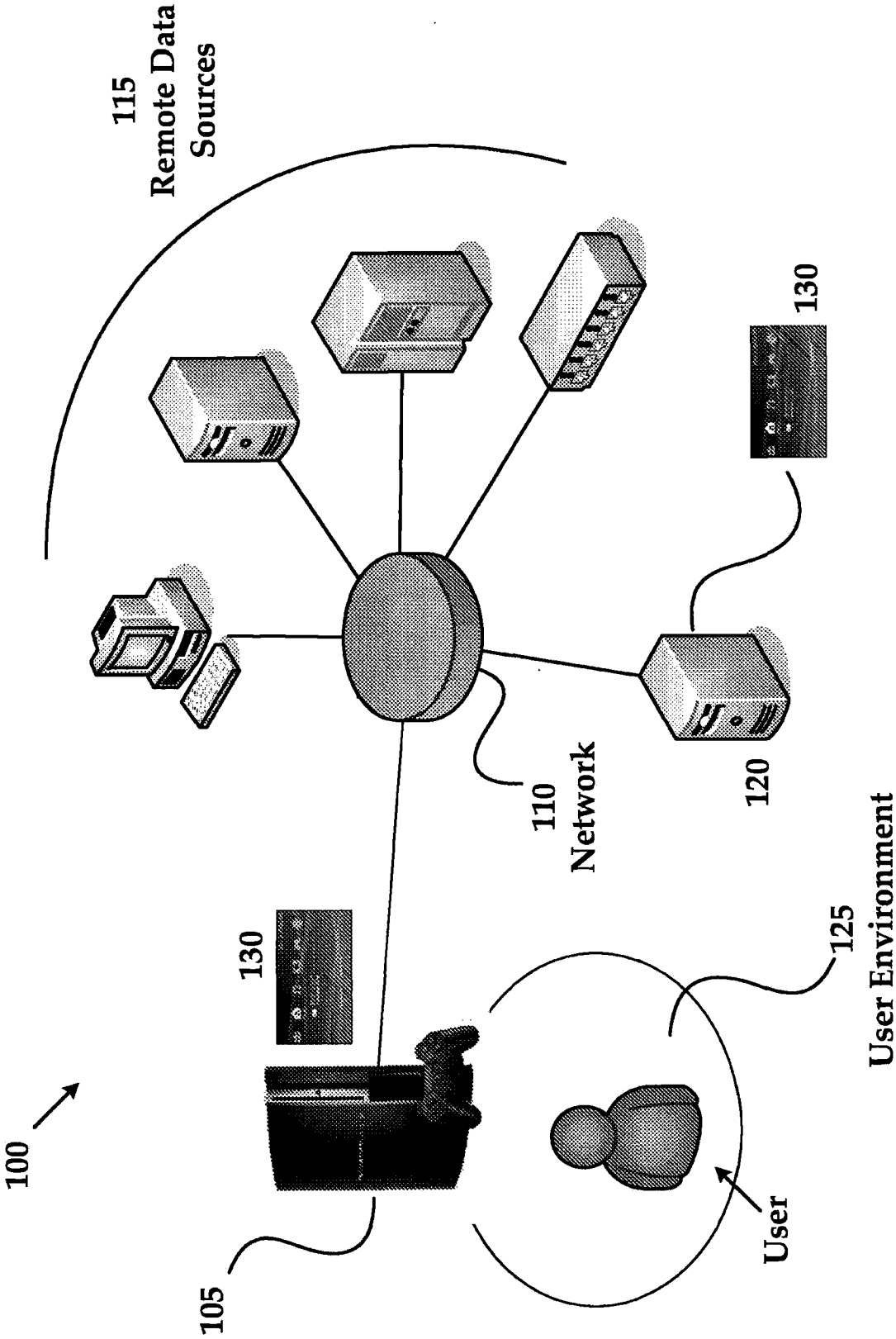


FIGURE 1

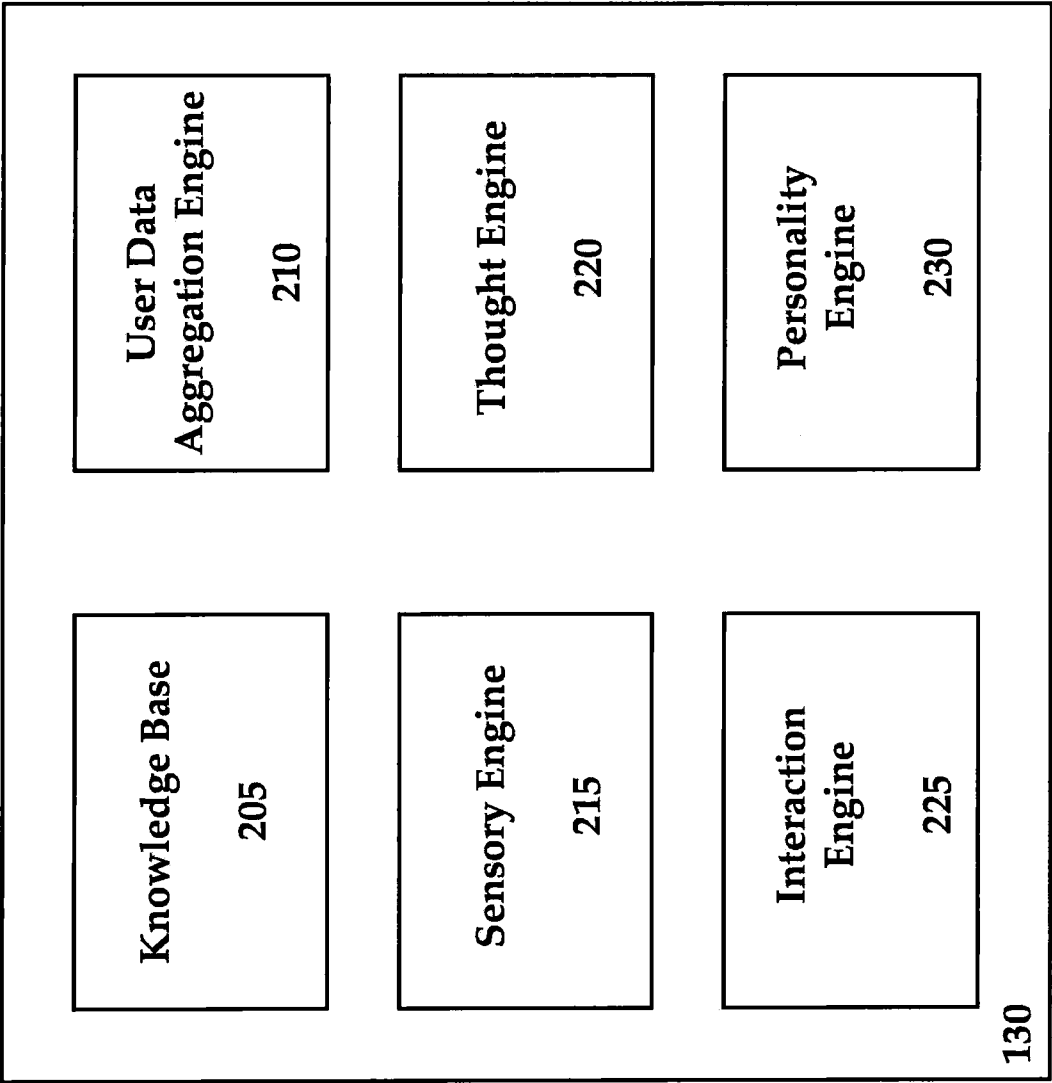


FIGURE 2

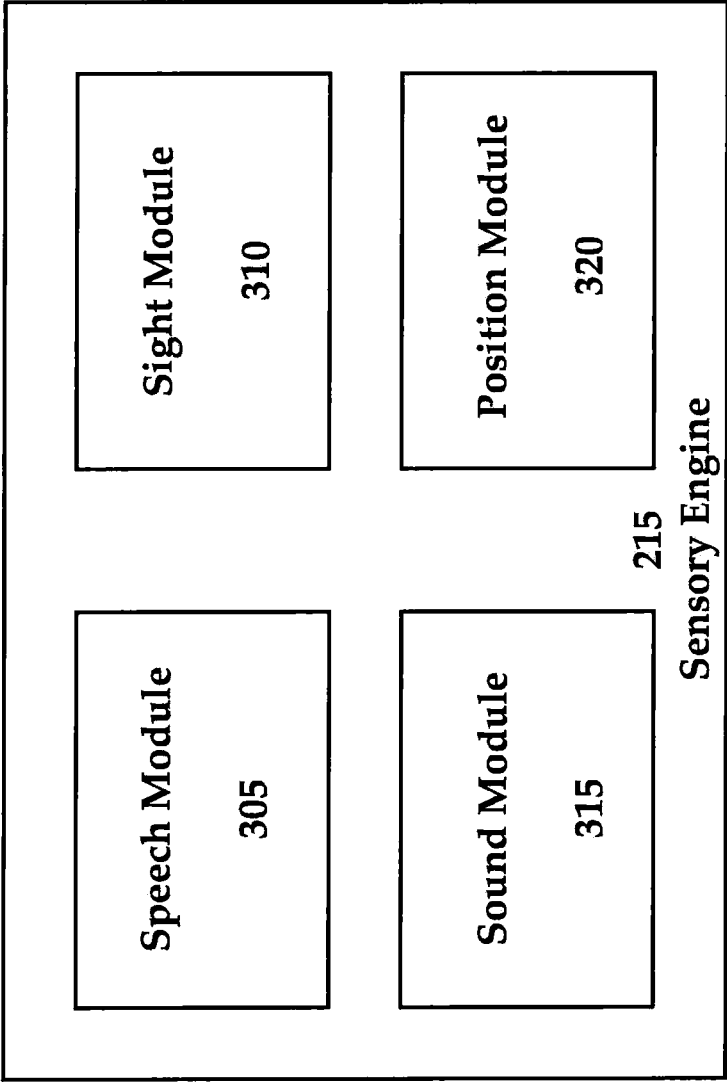


FIGURE 3

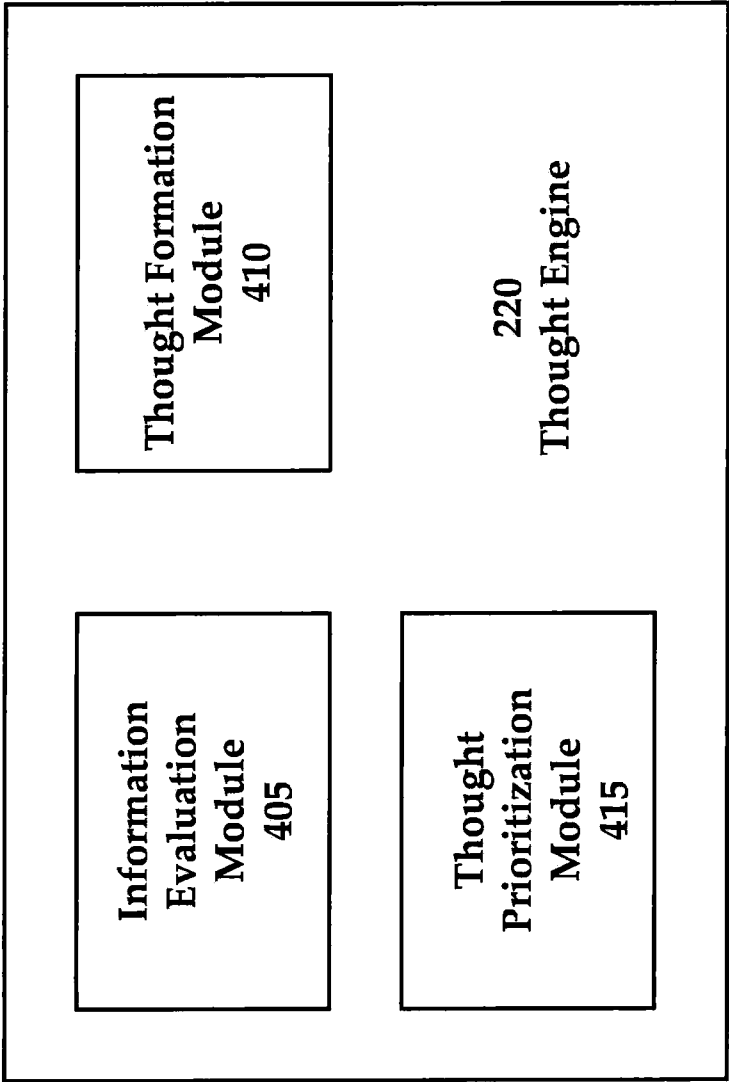


FIGURE 4

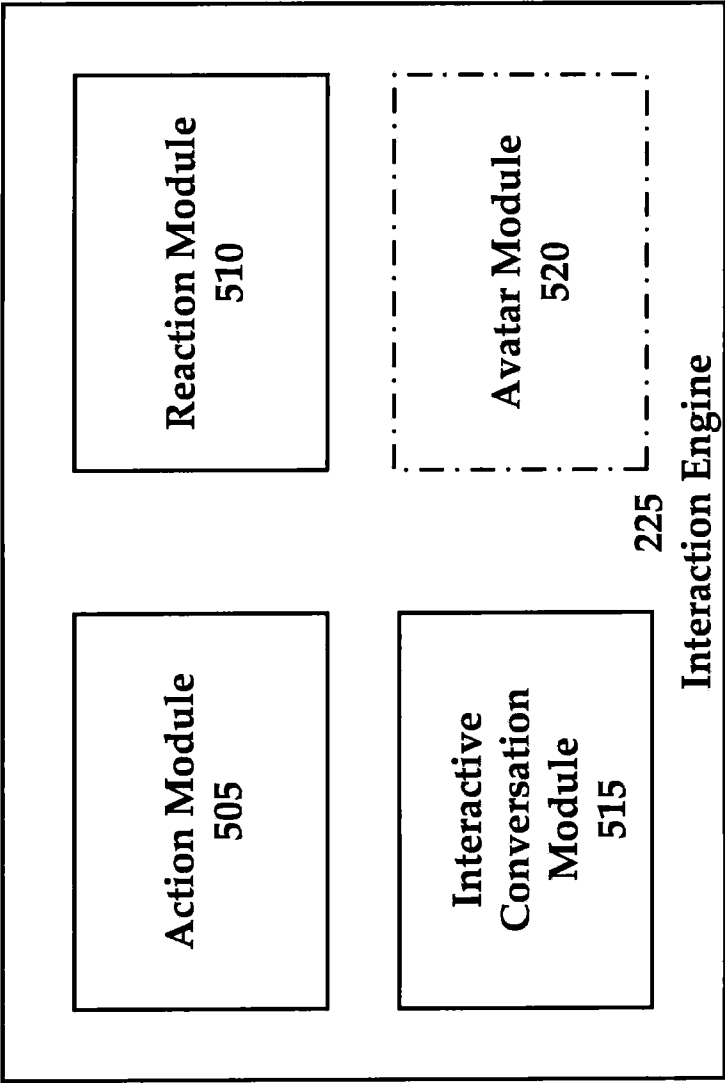


FIGURE 5

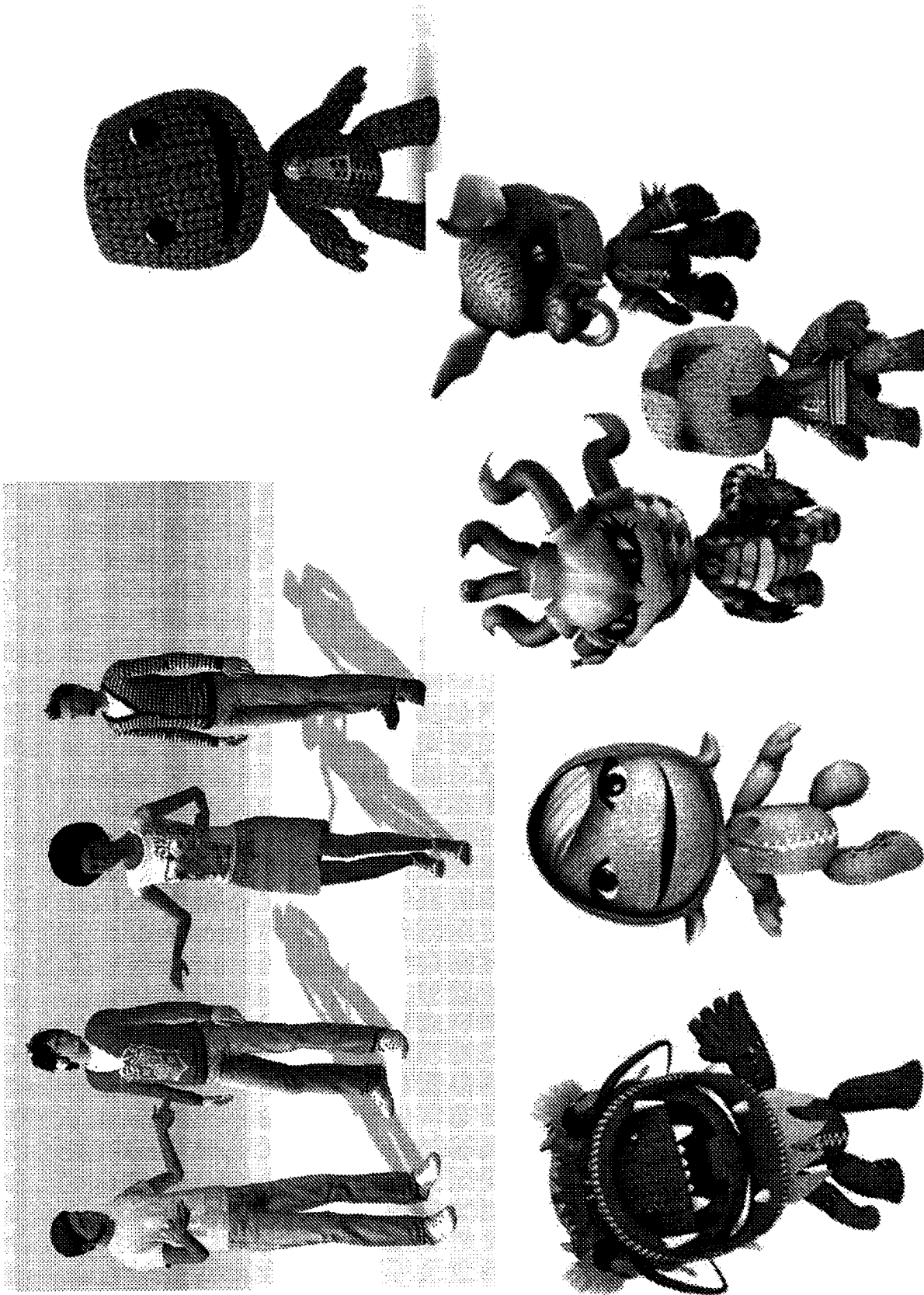


FIGURE 6

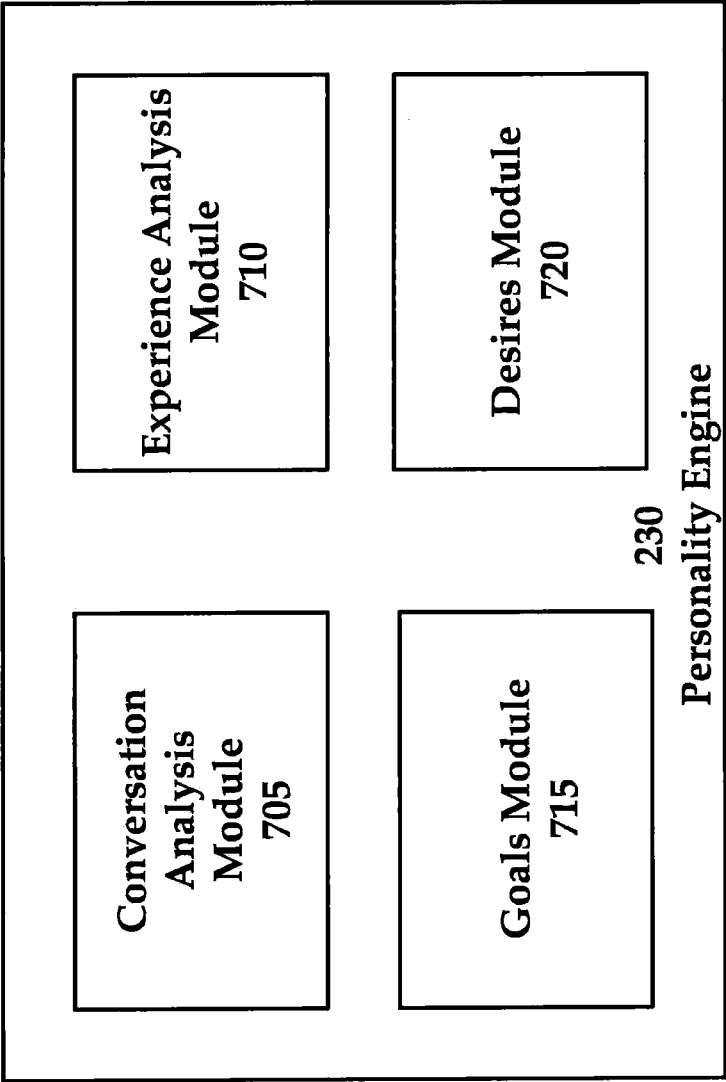
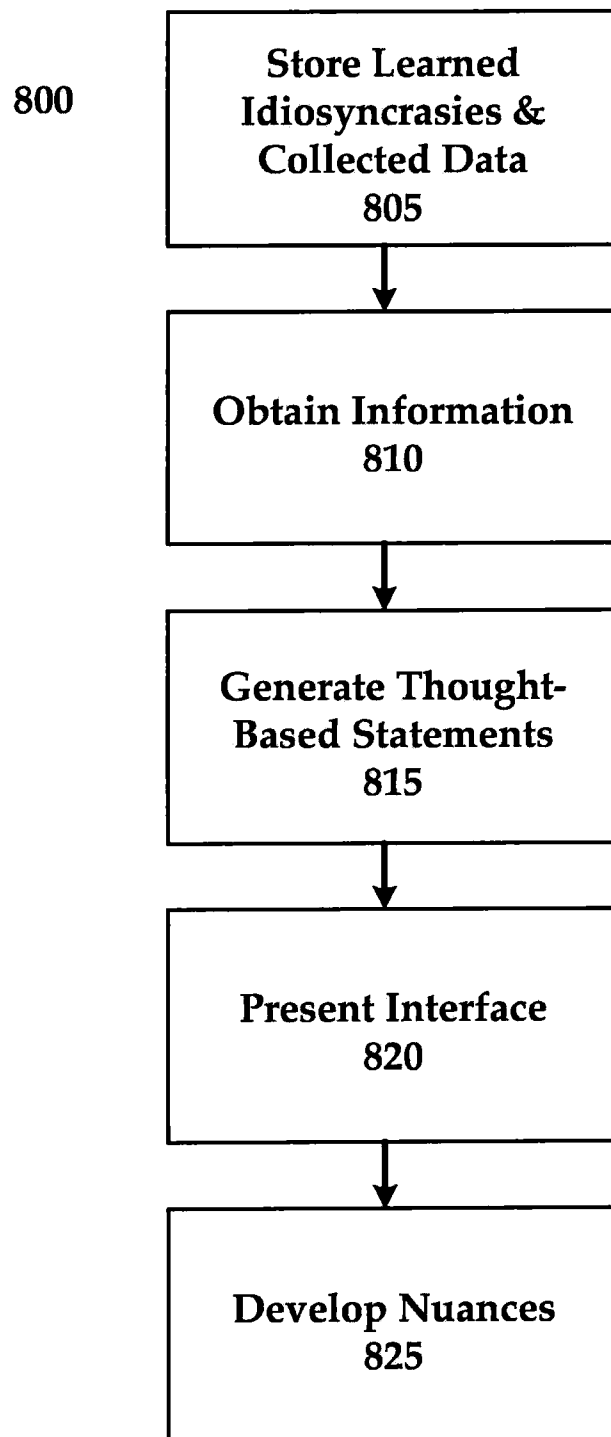


FIGURE 7

**FIGURE 8**

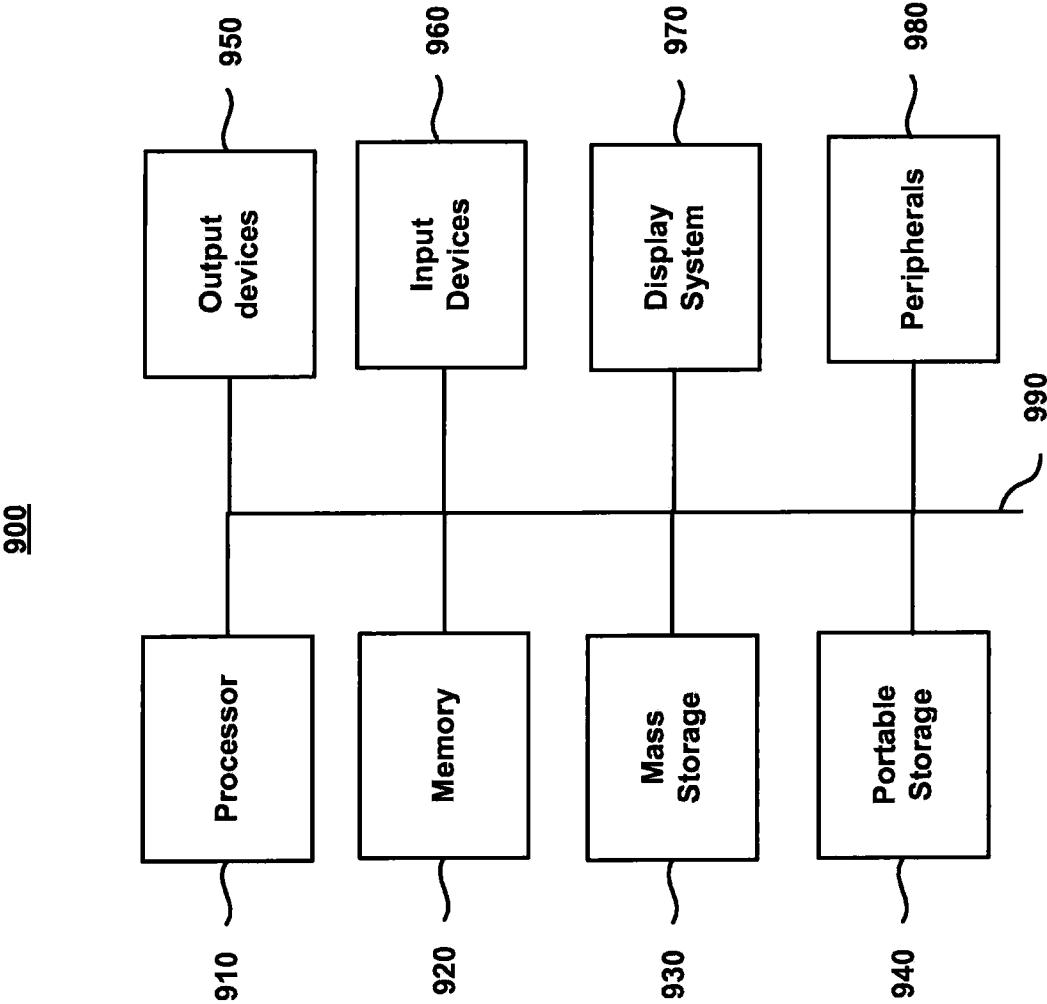


FIGURE 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 11/46826

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G06F 7/00; G06F 17/00 (2011.01)

USPC - 707/600

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: G06F 7/00; G06F 17/00 (2011.01)

USPC: 707/600

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

IPC: G06F 7/00; G06F 17/00 (2011.01)

USPC: 707/600, 601; 715/700, 707, 708 (keyword limited; terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 pubWEST(USPT,PGPB,EPAB,JPAB,USOCR); Google(Web); Search terms used: avatar user interface interaction responsive adapt
 idiosyncrasies nuances personality mannerism user profile member themselves personal common learn mimic emulate imitate drawl
 articulation gestures body language pose accent vernacular evolve matures recognition

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/0074114 A1 (Adjali et al.) 29 March 2007 (29.03.2007), entire document especially Fig. 1, 2; para [0025], [0027], [0031]-[0034], [0041]-[0045], [0086]-[0095], [0101], [0115]	1-17
X	US 2010/0097395 A1 (Chang et al.) 22 April 2010 (22.04.2010), entire document especially para [0009]-[0011], [0060]-[0072]	1, 15, 17
X	US 6,795,808 B1 (Strubbe et al.) 21 September 2004 (21.09.2004), entire document especially col. 8, 13, 18, 20-23	1, 15, 17
A	US 2010/0050078 A1 (Refuah et al.) 25 February 2010 (25.02.2010), entire document	1-17
A	US 2007/0038331 A1 (Hanson) 15 February 2007 (15.02.2007), entire document	1-17

☐ Further documents are listed in the continuation of Box C.


* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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

"&" document member of the same patent family

Date of the actual completion of the international search

08 December 2011 (08.12.2011)

Date of mailing of the international search report

20 DEC 2011

Name and mailing address of the ISA/US

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