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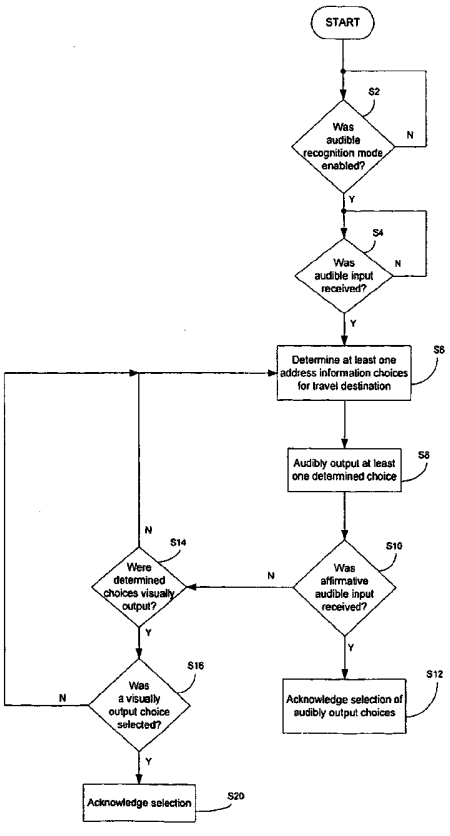
(54) Title: A NAVIGATION DEVICE, A METHOD OF AND A COMPUTER PROGRAM FOR OPERATING THE NAVIGATION DEVICE COMPRISING AN AUDIBLE RECOGNITION MODE




(57) Abstract: A method of operating a navigation device. includes receiving an indication of enablement of an audible recognition mode in the navigation device; determining at least one choice relating to address information of a travel destination based upon the received audible input; audibly outputting the at least one determined choice; and acknowledging selection of the audibly output upon receiving an affirmative audible input. The navigation device includes a processor, memory, a microphone, user input means and a visual display to receive an indication of enablement of an audible recognition mode and to determine at least one choice relating to address information of a travel destination based upon the received audible input; and an output device to audibly output the at least one determined choice, the processor being further useable to acknowledge selection of the audibly output of the at least one determined choice upon receiving an affirmative audible input.

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# A NAVIGATION DEVICE, A METHOD OF AND A COMPUTER PROGRAM FOR OPERATING THE NAVIGATION DEVICE COMPRISING AN AUDIBLE RECOGNITION MODE

## Field

The present application generally relates to navigation methods and devices.

## Background

Navigation devices were traditionally utilized mainly in the areas of vehicle use, such as on cars, motorcycles, trucks, boats, etc. Alternatively, if such navigation devices were portable, they were further transferable between vehicles and/or useable outside the vehicle, for foot travel for example. These devices are typically tailored to produce a route of travel based upon an initial position of the navigation device and a selected/input travel destination (end position), noting that the initial position could be entered into the device, but is traditionally calculated via GPS Positioning from a GPS receiver within the navigation device. To aid in navigation of the route, instructions are output along the route to a user of the navigation device. These instructions may be a least one of audible and visual.

## SUMMARY

The inventors discovered that users of navigation devices may have some difficulty in operating and viewing touch panel screens. Thus, the inventors discovered that user's desire at least limited hands free access, especially when using the navigation device in a vehicle. As such, the inventors developed methods which allow hands-free or at least partial hands free access by utilizing an audible recognition mode.

In at least one embodiment of the present application, a method includes receiving an indication of enablement of an audible recognition mode in a navigation device; determining, subsequent to receiving an indication of enablement of the audible recognition mode and subsequent to receiving an audible input, at least one choice relating to address information of a travel destination based upon the received audible input; audibly outputting at least

one determined choice relating to address information of a travel destination; and acknowledging selection of the audibly output at least one determined choice upon receiving an affirmative audible input.

In at least one embodiment of the present application, a navigation device includes a processor to receive an indication of enablement of an audible recognition mode in a navigation device and to determine, subsequent to receiving an audible input, at least one choice relating to address information of a travel destination based upon the received audible input; and an output device to audibly output at least one determined choice relating to address information of a travel destination, the processor being further useable to acknowledge selection of the audibly output at least one determined choice upon receiving an affirmative audible input .

In at least one other embodiment of the present application, a method includes receiving an indication of enablement of an audible recognition mode in a navigation device; and displaying on an integrated input and display device, subsequent to receiving an indication of enablement of the audible recognition mode, an indication as to whether a volume of a received audible input is within an acceptable range, louder than the acceptable range, and softer than the acceptable range.

In at least one other embodiment of the present application, a navigation device includes a processor to receive an indication of enablement of an audible recognition mode in a navigation device; and an integrated input and display device to display, subsequent to the processor receiving an indication of enablement of the audible recognition mode, an indication as to whether a volume of a received audible input is within an acceptable range, louder than the acceptable range, and softer than the acceptable range.

In at least one other embodiment of the present application, a method includes receiving an indication of enablement of an audible recognition mode in a navigation device; receiving additional information from a source other than a user of the navigation device; formulating a question, answerable by a yes or no answer from the user, based upon the received additional information; and outputting the formulated question to the user.

In at least one other embodiment of the present application, a navigation device includes a processor to receive an indication of enablement of an audible recognition mode, to receive additional information from a source other than a user of the navigation device, and to formulate a question, answerable by a yes or no answer from the user, based upon the received additional information; and an output device to output the formulated question to the use.

## BRIEF DESCRIPTION OF THE DRAWINGS

The present application will be described in more detail below by using example embodiments, which will be explained with the aid of the drawings, in which:
Figure 1 illustrates an example view of a Global Positioning System (GPS);
Figure 2 illustrates an example block diagram of electronic components of a navigation device of an embodiment of the present application;
Figure 3 illustrates an example block diagram of a server, navigation device and connection therebetween of an embodiment of the present application;
Figures 4A and 4B are perspective views of an implementation of an embodiment of the navigation device;
Figure 5 illustrates a flow chart of an embodiment of a method of the present application;
Figures 6A-D are examples of audible recognition mode icons for display in an embodiment of the present application;
Figure 7 illustrates an example chart of an embodiment of the present application;
Figure 8 illustrates a flow chart of an embodiment of a method of the present application; and
Figure 9 illustrates a flow chart of an embodiment of a method of the present application.

## DETAILED DESCRIPTION OF THE EXAMPLE EMBODIMENTS

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the present invention. As used herein, the singular forms "a", "an", and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will

be further understood that the terms "includes" and/or "including", when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

In describing example embodiments illustrated in the drawings, specific terminology is employed for the sake of clarity. However, the disclosure of this patent specification is not intended to be limited to the specific terminology so selected and it is to be understood that each specific element includes all technical equivalents that operate in a similar manner.

Referencing the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, example embodiments of the present patent application are hereafter described. Like numbers refer to like elements throughout. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

Figure 1 illustrates an example view of Global Positioning System (GPS), usable by navigation devices, including the navigation device of embodiments of the present application. Such systems are known and are used for a variety of purposes. In general, GPS is a satellite-radio based navigation system capable of determining continuous position, velocity, time, and in some instances direction information for an unlimited number of users.

Formerly known as NAVSTAR, the GPS incorporates a plurality of satellites which work with the earth in extremely precise orbits. Based on these precise orbits, GPS satellites can relay their location to any number of receiving units. The GPS system is implemented when a device, specially equipped to receive GPS data, begins scanning radio frequencies for GPS satellite signals. Upon receiving a radio signal from a GPS satellite, the device determines the precise location of that satellite via one of a plurality of different conventional methods. The device will continue scanning, in most instances, for signals until it has acquired at least three different satellite signals (noting that position is not normally, but can be determined, with only two signals using other triangulation techniques). Implementing geometric triangulation, the receiver utilizes the three known positions to determine its own two-dimensional

position relative to the satellites. This can be done in a known manner. Additionally, acquiring a fourth satellite signal will allow the receiving device to calculate its three dimensional position by the same geometrical calculation in a known manner. The position and velocity data can be updated in real time on a continuous basis by an unlimited number of users.

As shown in Figure 1, the GPS system is denoted generally by reference numeral 100. A plurality of satellites 120 are in orbit about the earth 124. The orbit of each satellite 120 is not necessarily synchronous with the orbits of other satellites 120 and, in fact, is likely asynchronous. A GPS receiver 140, usable in embodiments of navigation devices of the present application, is shown receiving spread spectrum GPS satellite signals 160 from the various satellites 120.

The spread spectrum signals 160, continuously transmitted from each satellite 120, utilize a highly accurate frequency standard accomplished with an extremely accurate atomic clock. Each satellite 120, as part of its data signal transmission 160, transmits a data stream indicative of that particular satellite 120. It is appreciated by those skilled in the relevant art that the GPS receiver device 140 generally acquires spread spectrum GPS satellite signals 160 from at least three satellites 120 for the GPS receiver device 140 to calculate its two-dimensional position by triangulation. Acquisition of an additional signal, resulting in signals 160 from a total of four satellites 120, permits the GPS receiver device 140 to calculate its three-dimensional position in a known manner.

Figure 2 illustrates an example block diagram of electronic components of a navigation device 200 of an embodiment of the present application, in block component format. It should be noted that the block diagram of the navigation device 200 is not inclusive of all components of the navigation device, but is only representative of many example components.

The navigation device 200 is located within a housing (not shown). The housing includes a processor 210 connected to an input device 220 and a display screen 240. The input device 220 can include a keyboard device, voice input device, touch panel and/or any other known input device utilized to input information; and the display screen 240 can include any type of display screen such as an

LCD display, for example. In at least one embodiment of the present application, the input device 220 and display screen 240 are integrated into an integrated input and display device, including a touchpad or touchscreen input wherein a user need only touch a portion of the display screen 240 to select one of a plurality of display choices or to activate one of a plurality of virtual buttons.

In addition, other types of output devices 241 can also include, including but not limited to, an audible output device. As output device 241 can produce audible information to a user of the navigation device 200, it is equally understood that input device 240 can also include a microphone and software for receiving input voice commands as well.

In the navigation device 200, processor 210 is operatively connected to and set to receive input information from input device 240 via a connection 225, and operatively connected to at least one of display screen 240 and output device 241, via output connections 245, to output information thereto. Further, the processor 210 is operatively connected to memory 230 via connection 235 and is further adapted to receive/send information from/to input/output (I/O) ports 270 via connection 275, wherein the I/O port 270 is connectible to an I/O device 280 external to the navigation device 200. The external I/O device 270 may include, but is not limited to an external listening device such as an earpiece for example. The connection to I/O device 280 can further be a wired or wireless connection to any other external device such as a car stereo unit for hands-free operation and/or for voice activated operation for example, for connection to an ear piece or head phones, and/or for connection to a mobile phone for example, wherein the mobile phone connection may be used to establish a data connection between the navigation device 200 and the internet or any other network for example, and/or to establish a connection to a server via the internet or some other network for example.

The navigation device 200, in at least one embodiment, may establish a "mobile" network connection with the server 302 via a mobile device 400 (such as a mobile phone, PDA, and/or any device with mobile phone technology) establishing a digital connection (such as a digital connection via known Bluetooth technology for example). Thereafter, through its network service

provider, the mobile device 400 can establish a network connection (through the internet for example) with a server 302. As such, a "mobile" network connection is established between the navigation device 200 (which can be, and often times is mobile as it travels alone and/or in a vehicle) and the server 302 to provide a "real-time" or at least very "up to date" gateway for information. The establishing of the network connection between the mobile device 400 (via a service provider) and another device such as the server 302, using the internet 410 for example, can be done in a known manner. This can include use of TCP/IP layered protocol for example. The mobile device 400 can utilize any number of communication standards such as CDMA, GSM, WAN, etc.

As such, an internet connection may be utilized which is achieved via data connection, via a mobile phone or mobile phone technology within the navigation device 200 for example. For this connection, an internet connection between the server 302 and the navigation device 200 is established. This can be done, for example, through a mobile phone or other mobile device and a GPRS (General Packet Radio Service)-connection (GPRS connection is a high-speed data connection for mobile devices provided by telecom operators; GPRS is a method to connect to the internet.

The navigation device 200 can further complete a data connection with the mobile device 400, and eventually with the internet 410 and server 302, via existing Bluetooth technology for example, in a known manner, wherein the data protocol can utilize any number of standards, such as the GSRM, the Data Protocol Standard for the GSM standard, for example.

The navigation device 200 may include its own mobile phone technology within the navigation device 200 itself (including an antenna for example, wherein the internal antenna of the navigation device 200 can further alternatively be used). The mobile phone technology within the navigation device 200 can include internal components as specified above, and/or can include an insertable card, complete with necessary mobile phone technology and/or an antenna for example. As such, mobile phone technology within the navigation device 200 can similarly establish a network connection between the navigation device 200 and the server 302, via the internet 410 for example, in a manner similar to that of any mobile device 400.

For GRPS phone settings, the Bluetooth enabled device may be used to correctly work with the ever changing spectrum of mobile phone models, manufacturers, etc., model/manufacturer specific settings may be stored on the navigation device 200 for example. The data stored for this information can be updated in a manner discussed in any of the embodiments, previous and subsequent.

Figure 2 further illustrates an operative connection between the processor 210 and an antenna/receiver 250 via connection 255, wherein the antenna/receiver 250 can be a GPS antenna/receiver for example. It will be understood that the antenna and receiver designated by reference numeral 250 are combined schematically for illustration, but that the antenna and receiver may be separately located components, and that the antenna may be a GPS patch antenna or helical antenna for example.

Further, it will be understood by one of ordinary skill in the art that the electronic components shown in Figure 2 are powered by power sources (not shown) in a conventional manner. As will be understood by one of ordinary skill in the art, different configurations of the components shown in Figure 2 are considered within the scope of the present application. For example, in one embodiment, the components shown in Figure 2 may be in communication with one another via wired and/or wireless connections and the like. Thus, the scope of the navigation device 200 of the present application includes a portable or handheld navigation device 200.

In addition, the portable or handheld navigation device 200 of Figure 2 can be connected or "docked" in a known manner to a motorized vehicle such as a car or boat for example. Such a navigation device 200 is then removable from the docked location for portable or handheld navigation use.

Figure 3 illustrates an example block diagram of a server 302 and a navigation device 200 of the present application, via a generic communications channel 318, of an embodiment of the present application. The server 302 and a navigation device 200 of the present application can communicate when a connection via communications channel 318 is established between the server 302 and the navigation device 200 (noting that such a connection can be a data

connection via mobile device, a direct connection via personal computer via the internet, etc.).

The server 302 includes, in addition to other components which may not be illustrated, a processor 304 operatively connected to a memory 306 and further operatively connected, via a wired or wireless connection 314, to a mass data storage device 312. The processor 304 is further operatively connected to transmitter 308 and receiver 310, to transmit and send information to and from navigation device 200 via communications channel 318. The signals sent and received may include data, communication, and/or other propagated signals. The transmitter 308 and receiver 310 may be selected or designed according to the communications requirement and communication technology used in the communication design for the navigation system 200. Further, it should be noted that the functions of transmitter 308 and receiver 310 may be combined into a signal transceiver.

Server 302 is further connected to (or includes) a mass storage device 312, noting that the mass storage device 312 may be coupled to the server 302 via communication link 314. The mass storage device 312 contains a store of navigation data and map information, and can again be a separate device from the server 302 or can be incorporated into the server 302.

The navigation device 200 is adapted to communicate with the server 302 through communications channel 318, and includes processor, memory, etc. as previously described with regard to Figure 2, as well as transmitter 320 and receiver 322 to send and receive signals and/or data through the communications channel 318, noting that these devices can further be used to communicate with devices other than server 302. Further, the transmitter 320 and receiver 322 are selected or designed according to communication requirements and communication technology used in the communication design for the navigation device 200 and the functions of the transmitter 320 and receiver 322 may be combined into a single transceiver.

Software stored in server memory 306 provides instructions for the processor 304 and allows the server 302 to provide services to the navigation device 200. One service provided by the server 302 involves processing requests from the navigation device 200 and transmitting navigation data from the mass data

storage 312 to the navigation device 200. According to at least one embodiment of the present application, another service provided by the server 302 includes processing the navigation data using various algorithms for a desired application and sending the results of these calculations to the navigation device 200.

The communication channel 318 generically represents the propagating medium or path that connects the navigation device 200 and the server 302. According to at least one embodiment of the present application, both the server 302 and navigation device 200 include a transmitter for transmitting data through the communication channel and a receiver for receiving data that has been transmitted through the communication channel.

The communication channel 318 is not limited to a particular communication technology. Additionally, the communication channel 318 is not limited to a single communication technology; that is, the channel 318 may include several communication links that use a variety of technology. For example, according to at least one embodiment, the communication channel 318 can be adapted to provide a path for electrical, optical, and/or electromagnetic communications, etc. As such, the communication channel 318 includes, but is not limited to, one or a combination of the following: electric circuits, electrical conductors such as wires and coaxial cables, fiber optic cables, converters, radio-frequency (rf) waves, the atmosphere, empty space, etc. Furthermore, according to at least one various embodiment, the communication channel 318 can include intermediate devices such as routers, repeaters, buffers, transmitters, and receivers, for example.

In at least one embodiment of the present application, for example, the communication channel 318 includes telephone and computer networks. Furthermore, in at least one embodiment, the communication channel 318 may be capable of accommodating wireless communication such as radio frequency, microwave frequency, infrared communication, etc. Additionally, according to at least one embodiment, the communication channel 318 can accommodate satellite communication.

The communication signals transmitted through the communication channel 318 include, but are not limited to, signals as may be required or desired for

given communication technology. For example, the signals may be adapted to be used in cellular communication technology such as Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA), Code Division Multiple Access (CDMA), Global System for Mobile Communications (GSM), etc. Both digital and analogue signals can be transmitted through the communication channel 318. According to at least one embodiment, these signals may be modulated, encrypted and/or compressed signals as may be desirable for the communication technology.

The mass data storage 312 includes sufficient memory for the desired navigation applications. Examples of the mass data storage 312 may include magnetic data storage media such as hard drives for example, optical storage media such as CD-Roms for example, charged data storage media such as flash memory for example, molecular memory, etc.

According to at least one embodiment of the present application, the server 302 includes a remote server accessible by the navigation device 200 via a wireless channel. According to at least one other embodiment of the application, the server 302 may include a network server located on a local area network (LAN), wide area network (WAN), virtual private network (VPN), etc.

According to at least one embodiment of the present application, the server 302 may include a personal computer such as a desktop or laptop computer, and the communication channel 318 may be a cable connected between the personal computer and the navigation device 200. Alternatively, a personal computer may be connected between the navigation device 200 and the server 302 to establish an internet connection between the server 302 and the navigation device 200. Alternatively, a mobile telephone or other handheld device may establish a wireless connection to the internet, for connecting the navigation device 200 to the server 302 via the internet.

The navigation device 200 may be provided with information from the server 302 via information downloads which may be periodically updated upon a user connecting navigation device 200 to the server 302 and/or may be more dynamic upon a more constant or frequent connection being made between the server 302 and navigation device 200 via a wireless mobile connection device and TCP/IP connection for example. For many dynamic calculations, the

processor 304 in the server 302 may be used to handle the bulk of the processing needs; however, processor 210 of navigation device 200 can also handle much processing and calculation, oftentimes independent of a connection to a server 302.

The mass storage device 312 connected to the server 302 can include volumes more cartographic and route data than that which is able to be maintained on the navigation device 200 itself, including maps, etc. The server 302 may process, for example, the majority of the devices of a navigation device 200 which travel along the route using a set of processing algorithms. Further, the cartographic and route data stored in memory 312 can operate on signals (e.g. GPS signals), originally received by the navigation device 200.

As indicated above in Figure 2 of the application, a navigation device 200 of an embodiment of the present application includes a processor 210, an input device 220, and a display screen 240. In at least one embodiment, the input device 220 and display screen 240 are integrated into an integrated input and display device to enable both input of information (via direct input, menu selection, etc.) and display of information through a touch panel screen, for example. Such a screen may be a touch input LCD screen, for example, as is well known to those of ordinary skill in the art. Further, the navigation device 200 can also include any additional input device 220 and/or any additional output device 241, such as audio input/output devices for example.

Figures 4A and 4B are perspective views of an actual implementation of an embodiment of the navigation device 200. As shown in Fig. 4A, the navigation device 200 may be a unit that includes an integrated input and display device 290 (a touch panel screen for example) and the other components of figure 2 (including but not limited to internal GPS receiver 250, microprocessor 210, a power supply, memory systems 220, etc.).

The navigation device 200 may sit on an arm 292, which itself may be secured to a vehicle dashboard/window/etc. using a large suction cup 294. This arm 292 is one example of a docking station to which the navigation device 200 can be docked.

As shown in Fig. 4B, the navigation device 200 can be docked or otherwise connected to an arm 292 of the docking station by snap connecting the

navigation device 292 to the arm 292 for example (this is only one example, as other known alternatives for connection to a docking station are within the scope of the present application). The navigation device 200 may then be rotatable on the arm 292, as shown by the arrow of Fig. 4B. To release the connection between the navigation device 200 and the docking station, a button on the navigation device 200 may be pressed, for example (this is only one example, as other known alternatives for disconnection to a docking station are within the scope of the present application).

In at least one embodiment of the present application, a method includes receiving an indication of enablement of an audible recognition mode in a navigation device 200; determining, subsequent to receiving an indication of enablement of the audible recognition mode and subsequent to receiving an audible input, at least one choice relating to address information of a travel destination based upon the received audible input; audibly outputting at least one determined choice relating to address information of a travel destination; and acknowledging selection of the audibly output at least one determined choice upon receiving an affirmative audible input .

In at least one embodiment of the present application, a navigation device 200 includes a processor 210 to receive an indication of enablement of an audible recognition mode in a navigation device 200 and to determine, subsequent to receiving an audible input, at least one choice relating to address information of a travel destination based upon the received audible input; and an output device 241 to audibly output at least one determined choice relating to address information of a travel destination, the processor 210 being further useable to acknowledge selection of the audibly output at least one choice upon receiving an affirmative audible input.

Figure 5 illustrates a flowchart of an example embodiment of the present application. In the embodiment shown in Figure 5, it is first determined is step S2 whether or not an audible recognition mode has been enabled in the navigation device. For example, as shown in Figure 6A, an icon can be displayed on an integrated input and display device 290 of the navigation device 200. Such an icon can be displayed in an initial or subsequent menu for selection prior to input/selection of a destination for establishing a route of

travel and/or can be displayed along with map information, for example, during use of the navigation device in a navigation mode. This icon can include just a pictorial illustration, such as the lips shown in Figure 6A, and/or can include text indicating that the button corresponds to an audible recognition mode, such as audible speech recognition (ASR). Upon a processor 210 of the navigation device 200 receiving an indication of selection of such an icon as shown in Figure 6A, an audible recognition mode may be enabled by the processor 210.

An audible recognition mode can include the processor 210 working in conjunction with an ASR engine or module. Such an ASR engine or module is a software engine that, once an audible recognition mode is enabled as explained above, can be loaded with grammatical rules, in a language of the country of the user of the navigation device 200 (or selected by the user, for example) for example. Thus, a user of the navigation device 200 will typically enter/select a country in which the user is located, and the language of that country can then be selected, input or matched by the processor 210. Thereafter, the ASR engine can then be loaded with grammatical rules from memory 230, upon an audible recognition mode being enabled. The ASR engine can then use the language corresponding to the chosen map to recognize geographical names (city and street names, for example) and the current user selected/enabled language to recognize common speech. For example, the system may be set up to enable recognition of complex speech from the user, or may be limited to only simple replies of yes, no, done, back, and/or numerical entries such as 1, 2, 3, etc. are of

The ASR engine or module is one which enables a speech interface between the user and the navigation device 200. Such a module is typically not usable in a portable navigation device 200 such as that shown in Figures 2-4B of the present application, but embodiments of the present application improve or even optimize memory management between the processor 210 and memory devices 230 for example, as well as data structures, to allow the ASR module to handle and recognize input information. Essentially, all or most available memory in the memory device(s) 230 of the navigation device 200 are allocated to the ASR module during speech recognition; namely upon the audible

recognition mode being enabled in step S2 of Figure 5, while other processes of the processor 210 are put on hold. Of course, during use of the navigation device 200 in a navigation mode, certain processes devoted to display of navigation information and output of navigation instructions must continue, thus sometimes slowing down operation of the ASR module.

In one example embodiment of the present application, the ASR module is primarily utilized in selecting address information of a travel destination based upon received audible input, and thus typically operates at a time when the navigation device 200 is not in use in a navigation mode. Upon the navigation device 200 operating in a navigation mode, another embodiment of the present application involves formulating simple questions, answerable by a yes/no answer (for example) from the user, to thereby enable processing capacity to be allocated to the navigation mode, with only a small amount of processing capacity needed in the ASR module to recognize such yes/no answers from the user of the navigation device 200. Thus, although the process shown in Figure 5 can operate during use of the navigation device 200 in the navigation mode, upon sufficient memory 230 being included in the navigation device 200 and/or upon the ASR module being used to recognize Yes/NO limited input information for example, the operation shown in Figure 5 typically occurs before start of the vehicle in which the navigation device 200 is located, namely before a travel destination is input into the navigation device 200 and before a travel route is determined.

Referring back to Figure 5, in step S2, if the audible recognition mode is not enabled, the system cycles back to repeat step S2. However, if the audible recognition mode is enabled, by the processor 210 receiving an indication of selection of the "talk to me" icon shown in Figure 6A for example, language and grammar information is loaded into the ASR module of the navigation device 200 from memory 230 and the navigation device 200 merely awaits an audible input in step S4. If no audible input is received, the system merely cycles back to repeat step S4 until an audible input is received.

The ASR module is typically utilized to recognize speech information from different users. Such information is typically unpredictable, and therefore cannot be stored in memory 230. The ASR module or engine operates in

conjunction with the processor 210 to convert received speech information to a sequence of phonemes in a known manner, and then works with processor 210 to match existing grammar of stored cities, street names, etc., to the converted sequence of phonemes.

In step S6, if an audible input is received, the processor 210 works with the ASR module to convert the input speech to phonemes and to compare the sequence of phonemes to stored information in memory 230 to determine at least one choice relating to address information of the travel destination based upon the received audible input. For example, in at least one embodiment, the at least one choice relating to address information of a travel destination can include a city name. Accordingly, a user may audibly output a name of a city as part of the address information of the travel destination, wherein the initial input of the city could be prompted by the navigation device 200 displaying a request, such as "In which city?" for example, to enter travel destination information. Upon receipt of this audible information, the processor 210 and ASR module process the phonemes as described above and compare this information to stored cities in memory 230 to determine at least one choice relating to the input audible sound, if possible. If nothing was recognized, the navigation device 200 may return to a screen to prompt input of the city or other address information, and may or may not flash or otherwise display a message "input not recognized", for example. As will be explained in another embodiment of the present application, a sound indicator can also be displayed to a user indicating whether or not the volume of audible input is within an acceptable range, louder than an acceptable range, or softer than an acceptable range, for example.

If at least one address information choice (such as a city for example) was determinable in step S6, the process proceeds to step S8 wherein at least one determined choice is audibly output relating to address information of a travel destination. For example, instead of the system merely guessing that an audible input was received correctly, the processor 210 instead directs audible output of at least one determined choice relating to address information of a travel destination in step S8. Thereafter, in step S10, the processor 210 waits to see if an affirmative audible output was received in step S10. If so, the

processor 210 and ASR module can then acknowledge that a correct determination occurred, and can thus acknowledge selection of the audibly output at least one determined choice upon receiving and recognizing an affirmative audible input, such as a "yes" for example.

Accordingly, instead of the processor 210 and ASR module merely guessing that an audible input was correct, at least one determined choice relating to address information is first audibly output, and selection of the at least one determined choice is not acknowledged until an affirmative audible input is received.

As stated in step S6, upon receipt of an audible input, at least one address information choice for the travel destination is determined, such as a city name for example. In at least one example embodiment of the present application, however, a plurality of "N-best" choices (not just one choice, noting that N can be any number, such as six for example) are recognized by the processor 210. Essentially, the processor 210, in conjunction with the ASR module, tries to best determine, from the phonemes of the audible input, a name of a city (in this first instance of input of address information for example). The processor 210 scans or reviews all the various cities stored in memory 230 for a match. The processor 210 then ranks the best possible matches such that the best possible match will be audibly output to the user of the navigation device 200 as the at least one determined choice relating to address information of the travel destination.

Accordingly, selection of the audibly output at least one determined choice can be acknowledged upon affirmative audible input in step S10. However, as "N-best" cities may be initially determined, the processor 210 can also direct the navigation device 200 to display an "N-best" list of choices, such as the N-best matches of city names determined by the processor 210 for example, on the integrated input and display device 290. The best possible match based upon the audible input received from the user may be audibly output and may further be displayed visually at the top of the "N-best" list (as the number one choice in a displayed list). Thereafter, next best choices can be visually displayed to the user in step S14 as numbered choices, such as choices two-six for example. Thereafter, a visually output choice may be selected in step S16, via display and subsequent input through the integrated input and display

device 290, for example. If selected, selection can be acknowledged in step S20 of Figure 5, by processor 210 for example.

Accordingly, the processor 210 and ASR module may not only be used to determine one single choice, but can be used to determine a plurality of choices relating to the address information of the travel destination. Each of the plurality of choices may be visually output and only one choice may be audibly output, for example. The plurality of choices may be visually output for selection on the integrated input and display device 290 of the navigation device 200. Each of these choices, such as a list of cities sounding most like the audible input for example, can be determined and displayed and are selectable by at least one of a touch panel and audible output. Further, the audibly output at least one choice is further selectable via receipt of an indication of touch panel input. In addition, each of the plurality of determined choices may be selectable via receipt of an indication of a touch panel input, and/or by audible input of a number corresponding to a displayed choice (for example, a user saying "two" to select the second displayed choice).

As one non-limiting example, if the city "Salt Lake City" is audibly output by a user of the navigation device 200, the processor 210 and ASR module can determine an "N-best" list of cities to be audibly and visually output. The first city in the displayed list may be "Salt Lake City", and may be both audibly output and visually output on an integrated input and display device 290 of the navigation device for example. Further, another "N-best" cities can be determined by processor 210 and the ASR module, including for example, five other cities such as Salem, Sacramento, San Antonio, Springfield, and Staunton. In one example embodiment of the present application, the "N-best" list includes a set number of choices, such as six choices for example. These six choices (the number one choice and the five other N-best cities) can then be displayed to the user for audible or touch panel input/selection. Accordingly, if all six choices are displayed in order on the touch panel of the integrated input and display device 290, the user may merely touch and thereby select one of the six choices. Alternatively, as the first choice "Salt Lake City" is audibly output to the user, the user can acknowledge selection of the audibly output choice by issuing an affirmative audible input. Alternatively, the user can

select any one of the other five displayed choices (or even the first choice for example) by merely stating the number corresponding to the particular choice, such as "6" representing the sixth choice of "Staunton."

By utilizing an affirmative audible input, and/or an audible input of only one of six numerical values, the processor 210 increases the likelihood of confirming a user's selection and thereby can adequately acknowledge selection of a particular choice by the user.

Thereafter, once a user selects a city name and such selection is acknowledged in steps S12 or S20, a user can issue another audible output, for input/receipt by the processor 210 and ASR module, corresponding to a street name for example. Thereafter, the processor 210 and ASR module can determine at least one street name subsequent to selection of city name and subsequent to receiving another audible output. Again, the processor 210 and ASR module may determine an "N-best" list of street names, for subsequent audible and/or visual output to the user of the navigation device 200, for subsequent selection thereof. Selection can be done in the same manner as discussed previously with regard to city names.

Finally, a user can audibly output a number corresponding to the last element of a travel destination address, for input/receipt by the processor 210 and ASR module, which can be recognized and which can be used to determine an "N-best" list in the same manner as previously stated with regard to the city and street names. Alternatively, the user may merely enter the numerical element (number) of the address of the travel destination. As such, an entire address of a travel destination can be input and can thereafter be used by the processor 210, to determine a travel route (in conjunction with a GPS signal indicating current location of the navigation device 200 and stored map information in memory 230, for example).

It should be noted that the process of Figure 5 can begin with audible input and recognition of a country and/or state for example, instead of a city name. Further, upon determining a plurality or "N-best" list of countries, states, cities, streets, etc., each of the plurality of countries, states, cities, or street names may be visually output and only one audibly output for subsequent selection

thereof, either by touch panel input or audible input in a manner similar to that previously described.

As previously discussed, Figure 6A provides an illustration of a non-limiting example of a selectable icon for enablement of an audible recognition mode. It should be noted that upon enablement of this audible recognition mode, the icon display may be varied to indicate to the user that the audible recognition mode has been enabled and that the system is merely awaiting receipt of the audible input as indicated in step 4 of Figure 5 for example. The display may include varying the icon displayed in some way, such as changing color of the virtual button shown in Figure 6A for example or otherwise changing appearance of this virtual button/icon. This is shown in Figure 6B, noting that the button may be a different color, such as green in color, when waiting for an audible input.

Thereafter, the virtual button/icon may be altered again while the system is determining address information choices for a travel destination in step S6 for example, in a manner such as that shown in Figure 6C for example. Finally, upon audibly outputting at least one determined choice in step S8 of Figure 5, the icon may again be altered as shown in Figure 6D for example. This can provide feedback to the user regarding the use of the audible recognition mode.

It should be noted that the determining of at least one choice relating to address information of the travel destination based upon a received audible input in step S6 of Figure 5 can relate to input of a country/state/city/street address of travel destination in a normal fashion for example, and/or can relate to determination of a travel destination based upon a recent destination, a Point of Interest, a favorite, etc., as shown in Figure 7 for example. Accordingly, upon receiving an indication of enablement of an audible recognition mode in step S2, a message such as "where would you like to go" can be displayed to the user on the integrated input and display device 290 of the navigation device 200 for example. Thereafter, the initial audible input received in step S4 could be that of a word relating to a category of information, such as "home" 710, "favorite" 720, "address" 730, "recent destination" 740 or "Point of Interest (POI)" 750. The processor 210 and ASR module can be programmed to recognize one of the aforementioned categories 710, 720, 730, 740, or 750,

such that the determined at least one choice relating to address information of a travel destination may include traditional information such as cities, state, street names, etc., or may include other types of information such as Points of Interest, favorites, etc. Again, each of these processes may determine an output of choices relating to address information of a travel destination, noting that a most likely choice may be audibly output and selection thereof acknowledged by affirmative audible input (or touch panel input), with other "N-best" choices being visually output with selection thereof being acknowledged by at least one of audible and visual input.

In one example embodiment, the recognition may work as follows:

For example, the recognition process for geographical names (cities, streets and crossings) may work according to the following rules:

The process may be initiated by the user (choosing the voice recognition address entry for example).

The processor 210/ASR module may then enter a listening mode and may indicate this with a special icon display, for example. The color of the icon may change if the level of the input is within an acceptable range, too low (no input), too loud or if the input has not been recognized properly (bad input). This may serve as a feedback to the user.

If the recognition input was considered acceptable by the processor 210/ASR module, it may then try to match the accepted phoneme sequence against the known sequences for the chosen grammar. Here, it is possible to combine the precompiled grammar (the list of names known already) with the dynamic part of the grammar (the names added by the user). This part might be emphasized as it is related to MapShare technology.

The processor 210/ASR module then may present the results to the user, via display on the integrated input and display device 290 in the form of N-best list. If the current voice is a TTS voice, for example, the best entry may be output (first in the list) to the user.

The user then may have the possibility to accept or to reject the result. In the first case, the processor 210/ASR module proceeds to the next step, which is either the recognition of the next address level (city->street, street->crossing or street->house number) or the planning of the route. In the second case, the

user has the possibility to pronounce the line number corresponding to the correct entry, if the entry is present in the list, or to go back to the previous step by saying "Back", for example.

It should be noted that each of the aforementioned aspects of an embodiment of the present application have been described with regard to the method of the present application. However, at least one embodiment of the present application is directed to a navigation device 200, including a processor 210 to receive an indication of enablement of an audible recognition mode in a navigation device 200 and to determine, subsequent to receiving an audible input, at least one choice relating to address information of a travel destination based upon the received audible input; and an output device 241 to audibly output at least one determined choice relating to address information of a travel destination, the processor 210 being further useable to acknowledge selection of the audibly output at least one choice upon receiving an affirmative audible input. Such a navigation device 200 may further include an integrated input and display device 290 as the output device 241 enable display of icons and/or selections, and subsequent selection thereof, and/or can further include an audible output device such as a speaker, for example. Further, an input device 220 can include a microphone. Thus, such a navigation device 200 may be used to perform the various aspects of the method described with regard to Figures 5-7, as would be understood by one of ordinary skill in the art. Thus, further explanation is omitted for the sake of brevity.

In at least one other embodiment of the present application, a method includes receiving an indication of enablement of an audible recognition mode in a navigation device 200; and displaying on an integrated input and display device 290, subsequent to receiving an indication of enablement of the audible recognition mode, an indication as to whether a volume of a received audible input is within an acceptable range, louder than the acceptable range, and softer than the acceptable range.

In at least one other embodiment of the present application, a navigation device 200 includes a processor 210 to receive an indication of enablement of an audible recognition mode in a navigation device 200; and an integrated input and display device 290 to display, subsequent to the processor 210 receiving an

indication of enablement of the audible recognition mode, an indication as to whether a volume of a received audible input is within an acceptable range, louder than the acceptable range, and softer than the acceptable range.

As previously indicated, an embodiment of the present application can be used to indicate to a user whether or not audible input, such as that of step S4 of Figure 5 for example, is within an acceptable range. As shown in Figure 8, it is initially determined by processor 210, for example in conjunction with the ASR module, whether or not an audible recognition mode was enabled in step S20. If so, three different displays can be displayed in steps S24, S28, and S32, depending on whether or not volume of the audible input is determined to be within an acceptable range. For example, upon receipt of the audible input, the processor 210 and ASR module can attempt to ascertain the input information. The processor 210 and ASR module have a better chance of determining a correct input if the volume is within an acceptable range.

Thus, after the audible recognition mode is enabled and after audible input information is received, it is determined in step S22 whether or not volume of the audible input is within an acceptable range. This can be done by the processor 210 comparing the volume of the received information with an acceptable range, stored in memory for example with a threshold upper limit and threshold lower limit. If the volume of the received audible input is within the upper and lower thresholds in Step S22, the processor then determines that the volume of the audible input is within an acceptable range. In response thereto, the process moves to step S24 wherein the processor 210 directs display of an indication that the volume is within an acceptable range. For example, this display may include changing the color of the "talk to me" icon shown in Figure 6A to an icon such as that shown in Figure 6B, in a green color indicative of acceptance for example. Alternatively, another indicator may be displayed, again noting that the indicator may be displayed in a color indicative of acceptance, such as a green color for example.

If it is determined that the volume is not within an acceptable range in step S22, the processor 210 then moves to either step S26 or step S30 to determine if the volume was louder than an acceptable range or softer than an acceptable range. It should be noted that the order of the steps of S26 and S30 is not

important; as such determinations can be made in any order. If it is determined that the volume is louder than an acceptable range in Step S26, namely greater than upper threshold of the acceptable range, an indication may be displayed in Step S28, indicating that the volume is louder than an acceptable range. For example, the icon of Figure 6B may be displayed in red, for example (a color indicative of incorrectness and something being too high), indicating that the audible input was too loud, and/or a red indicator may be displayed to the user, again indicating that the volume is too loud.
Thereafter, or before Step S26, the processor 210 moves to step S30 wherein it determines whether or not the volume is softer than an acceptable range. If so, an indication may be displayed in step S32, indicating that the volume is softer than an acceptable range. For example, this may involve displaying the icon of Figure 6B in a yellow color, for example, indicating to the user that the audible input is not loud enough. Alternatively, a yellow indicator may be displayed on the integrated information and display device 290 for example.
It should be noted that the use of the colors green, red, and yellow are merely examples and other colors can be utilized. Further, other methods of displaying indications of a volume being within an acceptable range, louder than an acceptable range, or softer than an acceptable range, may also be used, including but not limited to displaying of words indicating that a user should speak softer, louder, etc. Accordingly, as shown in the example embodiment of Figure 8, a method of the present application can include receiving an indication of enablement of an audible recognition mode in a navigation device 200 and displaying, on an integrated input and display device 290 and subsequent to receiving an indication of enablement of the audible recognition mode, an indication as to whether a volume of received audible input is within an acceptable range, louder than the acceptable range, and softer than the acceptable range. The display can include a display of color information to display the indications for example, wherein a yellow color may be used to indicate that the received audible input is softer than the acceptable range, a red color may be used to indicate that the received audible input is louder than the acceptable range, and a green color may be used to indicate that the received audible input is within an acceptable range.

Address information regarding a travel destination of a user may be received in conjunction with the process shown in Figure 8 for example, wherein the display may then indicate if the received information is within an acceptable range. Thus, the address information can include at least one of a city and street name information. Further, upon the address information being received within an acceptable range, the process may include at least one of recognizing the address information, displaying an indication of no recognition and displaying, on the integrated input and display device 290, a list of choices to the user for selection. Thus, the processes as shown in Figures 5 and 8 can be integrated.

It should be noted that each of the aforementioned aspects of an embodiment of the present application have been described with regard to the method of the present application. However, at least one embodiment of the present application is directed to a navigation device 200, including a processor 210 to receive an indication of enablement of an audible recognition mode in a navigation device 200; and an integrated input and display device 290 to display, subsequent to the processor 210 receiving an indication of enablement of the audible recognition mode, an indication as to whether a volume of a received audible input is within an acceptable range, louder than the acceptable range, and softer than the acceptable range. Such a navigation device 200 may further include an audible output device such as a speaker, for example. Further, an input device 220 can include a microphone. Thus, such a navigation device 200 may be used to perform the various aspects of the method described with regard to Figures 5-8, as would be understood by one of ordinary skill in the art. Thus, further explanation is omitted for the sake of brevity.

Finally, Figure 9 is directed to another embodiment of the present application. Typically, when entering the address information into a navigation device 200, a navigation device 200 is not being used in a navigation mode. Thus, although the process set forth in Figure 5 can be used with the navigation device 200 in a navigation mode, this is typically not the case as the vehicle, in which the navigation device 200 is located, for example, is usually stationary upon a user inputting a travel destination from which a route of travel can be determined.

In at least one other embodiment of the present application, a method includes receiving an indication of enablement of an audible recognition mode in a navigation device 200; receiving additional information from a source other than a user of the navigation device 200; formulating a question, answerable by a yes or no answer from the user, based upon the received additional information; and outputting the formulated question to the user.

In at least one other embodiment of the present application, a navigation device 200 includes a processor 210 to receive an indication of enablement of an audible recognition mode, to receive additional information from a source other than a user of the navigation device 200, and to formulate a question, answerable by a yes or no answer from the user, based upon the received additional information; and an output device 241 to output the formulated question to the use.

Figure 9 of the present application includes a process involving enablement of an audible recognition mode, which is more likely to be usable in a navigation device 200 on a vehicle in which the navigation device is located, is in moving; e.g. where the navigation device 200 is operated in a navigation mode.

In the process shown in Figure 9, in step S50, it is initially determined whether or not an audible recognition mode is enabled. This can be done, for example, in a manner similar to that previously described, including recognition of selection of the icon shown in Figure 6A for example. Once this audible recognition mode is enabled, the processor 210 of the navigation device 200 may not only monitor receipt of audible information from a user, but can also monitor receipt of additional information from a source other than a user of the navigation device 200. Thus, in step S52, it is determined by the processor 210 whether or not additional information from a source other than a user is received. This information can include but is not limited to receipt of an incoming call or message (such as a telephone call or SMS message received by the navigation device 200 itself and/or with a paired mobile phone, for example; received traffic information; etc.) If not, the process merely cycles back and continues to monitor for such information.

However, if additional information from a source other than the user of the navigation device 200 is received in step S52, the process moves to step S54

wherein a question is formulated by the processor 210, answerable by a yes or no answer from the user, based upon the received additional information. For example, the processor 210 can monitor other systems in the navigation device 200 (including paired mobile phones, for example) to determine whether or not, for example, an SMS message is received. If so, the processor 210 may work with both the ASR module and/or, more likely, a TTS module (Text To Speech) to formulate a question answerable by a yes/no answer from the user such as, for example, "A new message was received; shall I read it aloud?" Thereafter, the formulated question may be output in step S56, noting that the output is preferably an audible output (but may also be accompanied by a visual output for example). Somewhat similarly, when the navigation device 200 may determine receipt of a traffic update indicating a traffic delay along the route of a particular period of time (calculatable by the processor 210 in a known manner for example), wherein the processor 210 and TTS module can then instruct the output of, for example, "Traffic delay on your route now 'x' minutes. Do you want to replan the route to minimize delays?"

The ASR module is typically utilized to recognize speech information from different users. Such information is typically unpredictable, and therefore cannot normally be stored in memory 230. The ASR module or engine operates in conjunction with the processor 210 to convert received speech information to a sequence of phonemes in a dynamic manner, and works with processor 210 to match existing grammar of stored cities, street names, etc., to the converted sequence of phonemes as described above. As such, the ASR module dynamically causes the processor 210 to utilize large chunks of memory 230. To the contrary, when the processor 210 works in conjunction with a TTS module, the TTS module forms questions which can be predefined or prerecorded in memory 230 for example. The TTS module can output any kind of audio information, provided that it is in the language to which the voice corresponds. Some parts of the phrases that are considered to be used most often can be prerecorded, stored, and later used by the TTS module as well, to improve the quality of the output. Thus, while the TTS module can be used to convert simple SMS messages to voice output for the user, the TTS module typically works best in conjunction with processor 210 for outputting of

preformulated questions, slightly modifiable if necessary, upon a processor 210 determining that additional information such as an SMS message, traffic update, etc., has been received by the navigation device 200. Such information can include traffic information, an incoming telephone call, an incoming SMS message, etc.

Further, the formulating of the question can include inserting information, based upon the received information, into a stored question, such as inserting a traffic delay into the aforementioned traffic delay question for example. Thus, the formulating can include inserting information regarding a calculated traffic delay, based upon a received traffic information, into a stored question.

Thereafter, in step S56, the formulated question can be output, noting that the output may include at least one of an audible and visual output.

The formulated question output in step S56 is typically formulated to receive a yes or no answer from the user, to thereby enable the processor 210 to operate in conjunction with the ASR module during driving conditions when the navigation device 200 is operating in a navigation mode. In such a mode, the navigation device 200 is utilizing a lot of existing memory 230 and it is preferable to have the ASR module not utilize so much of memory 230. By utilizing yes/no questions, the processor 210 and ASR module can easily recognize the short yes or no answer of the user. Thereafter, a subsequent action may be performed by the navigation device 200 upon receipt of a yes answer from the user, such as calculating a new route of travel based upon receipt of a yes answer from the user regarding a calculated traffic delay for example. Alternatively, upon the additional information being an SMS message, the SMS message can be converted by utilizing the TTS module for example, and an incoming text message can be output to the user upon receipt of a yes answer from the user.

It should be noted that each of the aforementioned aspects of an embodiment of the present application have been described with regard to the method of the present application. However, at least one embodiment of the present application is directed to a navigation device 200, including a processor 210 to receive an indication of enablement of an audible recognition mode, to receive additional information from a source other than a user of the navigation device

200, and to formulate a question, answerable by a yes or no answer from the user, based upon the received additional information; and an output device 241 to output the formulated question to the use. Such a navigation device 200 may further include an integrated input and display device 290 as the output device 241 enable display of icons and/or selections, and subsequent selection thereof, and/or can further include an audible output device such as a speaker, for example. Further, an input device 220 can include a microphone. Thus, such a navigation device 200 may be used to perform the various aspects of the method described with regard to Figure 9, as would be understood by one of ordinary skill in the art. Thus, further explanation is omitted for the sake of brevity.

The methods of at least one embodiment expressed above may be implemented as a computer data signal embodied in the carrier wave or propagated signal that represents a sequence of instructions which, when executed by a processor (such as processor 304 of server 302, and/or processor 210 of navigation device 200 for example) causes the processor to perform a respective method. In at least one other embodiment, at least one method provided above may be implemented above as a set of instructions contained on a computer readable or computer accessible medium, such as one of the memory devices previously described, for example, to perform the respective method when executed by a processor or other computer device. In varying embodiments, the medium may be a magnetic medium, electronic medium, optical medium, etc.

Even further, any of the aforementioned methods may be embodied in the form of a program. The program may be stored on a computer readable media and is adapted to perform any one of the aforementioned methods when run on a computer device (a device including a processor). Thus, the storage medium or computer readable medium is adapted to store information and is adapted to interact with a data processing facility or computer device to perform the method of any of the above mentioned embodiments.

The storage medium may be a built-in medium installed inside a computer device main body or a removable medium arranged so that it can be separated from the computer device main body. Examples of the built-in medium include, but are not limited to, rewriteable non-volatile memories, such as ROMs and

flash memories, and hard disks. Examples of the removable medium include, but are not limited to, optical storage media such as CD-ROMs and DVDs; magneto-optical storage media, such as MOs; magnetism storage media, including but not limited to floppy disks (trademark), cassette tapes, and removable hard disks; media with a built-in rewriteable non-volatile memory, including but not limited to memory cards; and media with a built-in ROM, including but not limited to ROM cassettes; etc. Furthermore, various information regarding stored images, for example, property information, may be stored in any other form, or it may be provided in other ways.

As one of ordinary skill in the art will understand upon reading the disclosure, the electronic components of the navigation device 200 and/or the components of the server 302 can be embodied as computer hardware circuitry or as a computer readable program, or as a combination of both.

The system and method of embodiments of the present application include software operative on the processor to perform at least one of the methods according to the teachings of the present application. One of ordinary skill in the art will understand, upon reading and comprehending this disclosure, the manner in which a software program can be launched from a computer readable medium in a computer based system to execute the functions found in the software program. One of ordinary skill in the art will further understand the various programming languages which may be employed to create a software program designed to implement and perform at least one of the methods of the present application.

The programs can be structured in an object-orientation using an object-oriented language including but not limited to JAVA, Smalltalk, C++, etc., and the programs can be structured in a procedural-orientation using a procedural language including but not limited to COBAL, C, etc. The software components can communicate in any number of ways that are well known to those of ordinary skill in the art, including but not limited to by application of program interfaces (API), interprocess communication techniques, including but not limited to report procedure call (RPC), common object request broker architecture (CORBA), Component Object Model (COM), Distributed Component Object Model (DCOM), Distributed System Object Model (DSOM), and Remote

Method Invocation (RMI). However, as will be appreciated by one of ordinary skill in the art upon reading the present application disclosure, the teachings of the present application are not limited to a particular programming language or environment.

The above systems, devices, and methods have been described by way of example and not by way of limitation with respect to improving accuracy, processor speed, and ease of user interaction, etc. with a navigation device 200. Further, elements and/or features of different example embodiments may be combined with each other and/or substituted for each other within the scope of this disclosure and appended claims.

Still further, any one of the above-described and other example features of the present invention may be embodied in the form of an apparatus, method, system, computer program and computer program product. For example, of the aforementioned methods may be embodied in the form of a system or device, including, but not limited to, any of the structure for performing the methodology illustrated in the drawings.

Example embodiments being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

What is claimed is:

1. A method of operating a navigation device characterized by

positively determining that an audible recognition mode is enabled in a navigation device,

receiving an audible input,

processing both the audible input and additional information from a source other than a user of the navigation device,

formulating at least one response based on the audible input and the additional information, and

outputting the response by at least one of visual, audible and wireless signal transmission means.

2. A method according to claim 1 wherein the additional information is address information of travel destinations and one response is at least one determined choice of address information based on the audible input, said response being audibly output by the navigation device and subsequently acknowledged upon receiving a further affirmative audible input.

3. The method of claim 1 or 2, wherein, the response is a plurality of travel destinations each having address information, and wherein address information for each of the plurality of travel destinations is visually output and only one of which audibly output.

4. The method of claim 3, wherein the address information of each of the plurality of travel destinations is visually output for selection on an integrated input and display device of the navigation device, each of said travel destinations being selectable via receipt of an indication of a touch panel input.

5. The method of claim any preceding claim, wherein a plurality of responses are formulated and are subsequently selectable by audible input.

6. The method of claim 6 wherein the selection of one of the plurality of output responses is selectable by audible input a number corresponding to one of the responses.

7. The method of claim 2 or any claim dependent thereof, wherein the at least one determined choice of address information includes a city name.

8. The method of claim 7, wherein, subsequent to selection of a city name and subsequent to receiving another audible input, further address information in the form of at least one street name is determined.

9. The method of claim 8, wherein a plurality of street names is determined, said plurality being visually output and only one street name therefrom being audibly output.

10. A method according to any preceding claim wherein the additional information is volume level threshold information and one response is an indication as to whether a volume of the received audible input is within an acceptable range, louder than the acceptable range, and softer than the acceptable range.

11. The method of claim 10, wherein the response is output visually and includes a display of color information to display the indications.

12. The method of claim 11, wherein a yellow color is used to indicate that the received audible input is softer than the acceptable range, wherein a red color is used to indicate that the received audible input is louder than the acceptable range, and wherein a green color is used to indicate that the received audible input is within an acceptable range.

13. A method according to any preceding claim wherein the response is a question answerable by a yes or no answer from the user, based upon the received additional information.

14. The method of claim 13, wherein the information includes traffic information.

15. The method of claim 13 or 14, wherein the information includes receipt of at least one of an incoming call and message.

16. The method of any of claims 13-15, wherein the formulating of the question includes inserting information, based upon the received information, into said question, and retrievable storage thereof.

17. The method of claim 16, wherein the formulating of the question includes inserting information regarding a calculated traffic delay.

18. The method of claim 16, further comprising performing a subsequent action upon receipt of a yes answer from the user.

19. The method of claim 16, further comprising calculating a new route of travel upon receipt of a "yes" answer from the user regarding the calculated traffic delay.

20. A computer program comprising computer program code means adapted to perform all the steps of any of claims 1-19 when run on a computer.

21 A computer program as claimed in claim 20 when embodied on or in a computer readable medium.

22. A navigation device programmed to accomplish any of the methods of claims 1-19 and comprising:

a processor,

memory,

a microphone,

user input means,
a visual display, and
audio output means.

23. The navigation device of claim 22, wherein the user input means and visual display are integrated in a touch-sensitive visual display by means of which information can be both displayed and subsequently selected.

24. The navigation device of claim 22 or 23, wherein the navigation device is portable.

25 The navigation device of claim 22 or any claim dependent thereon wherein the visual display is a color display.

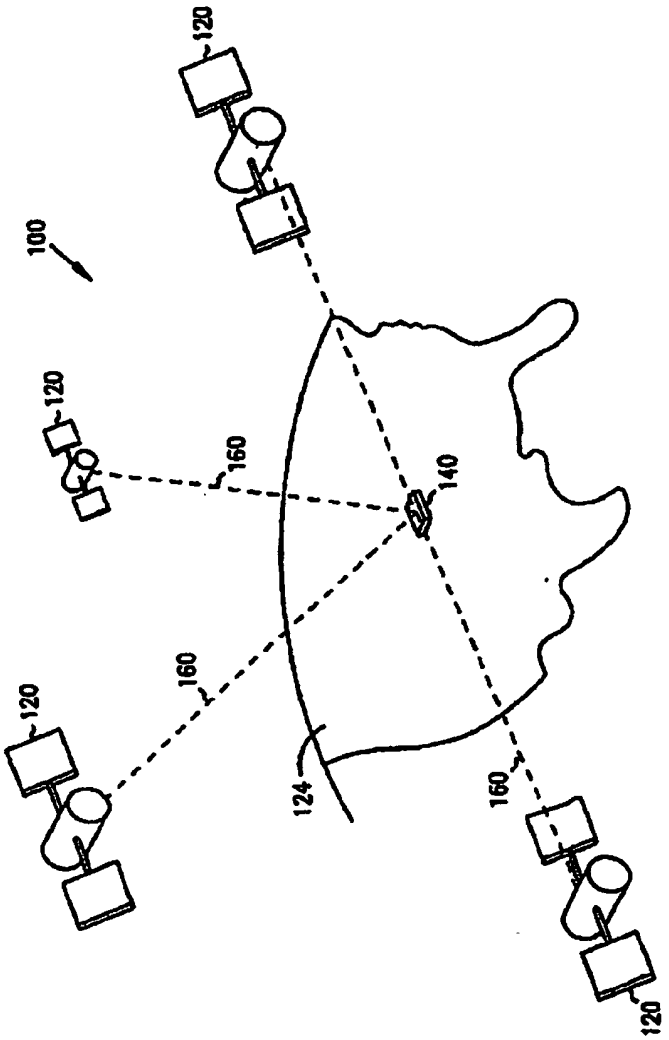


FIG. 1

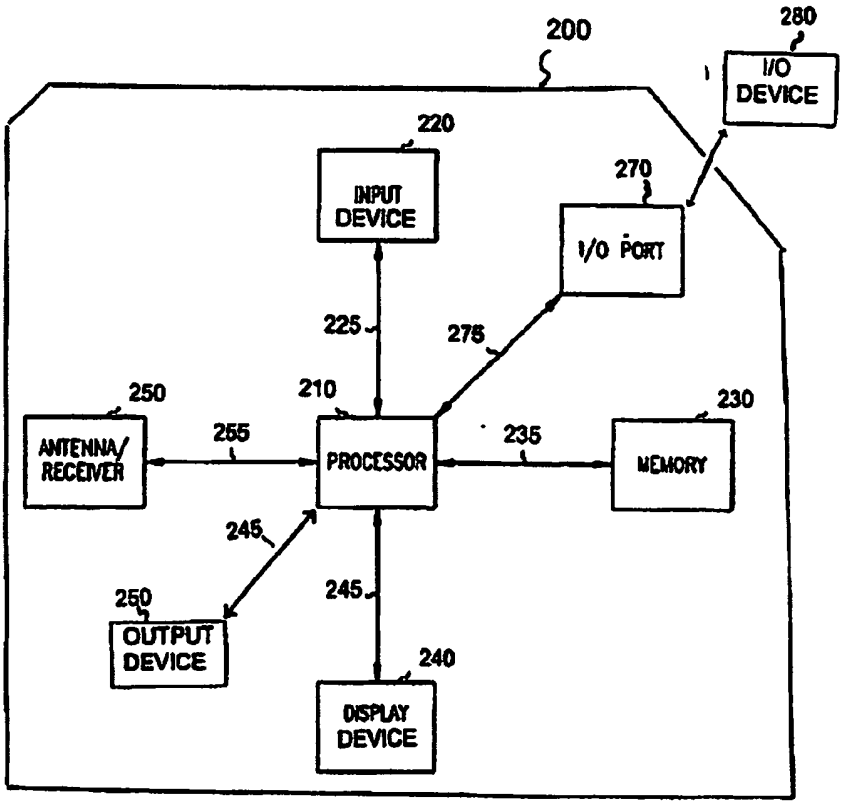
200
280
I/O DEVICE
220
INPUT DEVICE
270
I/O PORT
225
275
250
210
230
ANTENNA/ RECEIVER
255
PROCESSOR
235
MEMORY
245
245
250
OUTPUT DEVICE
240
DISPLAY DEVICE

Fig. 2

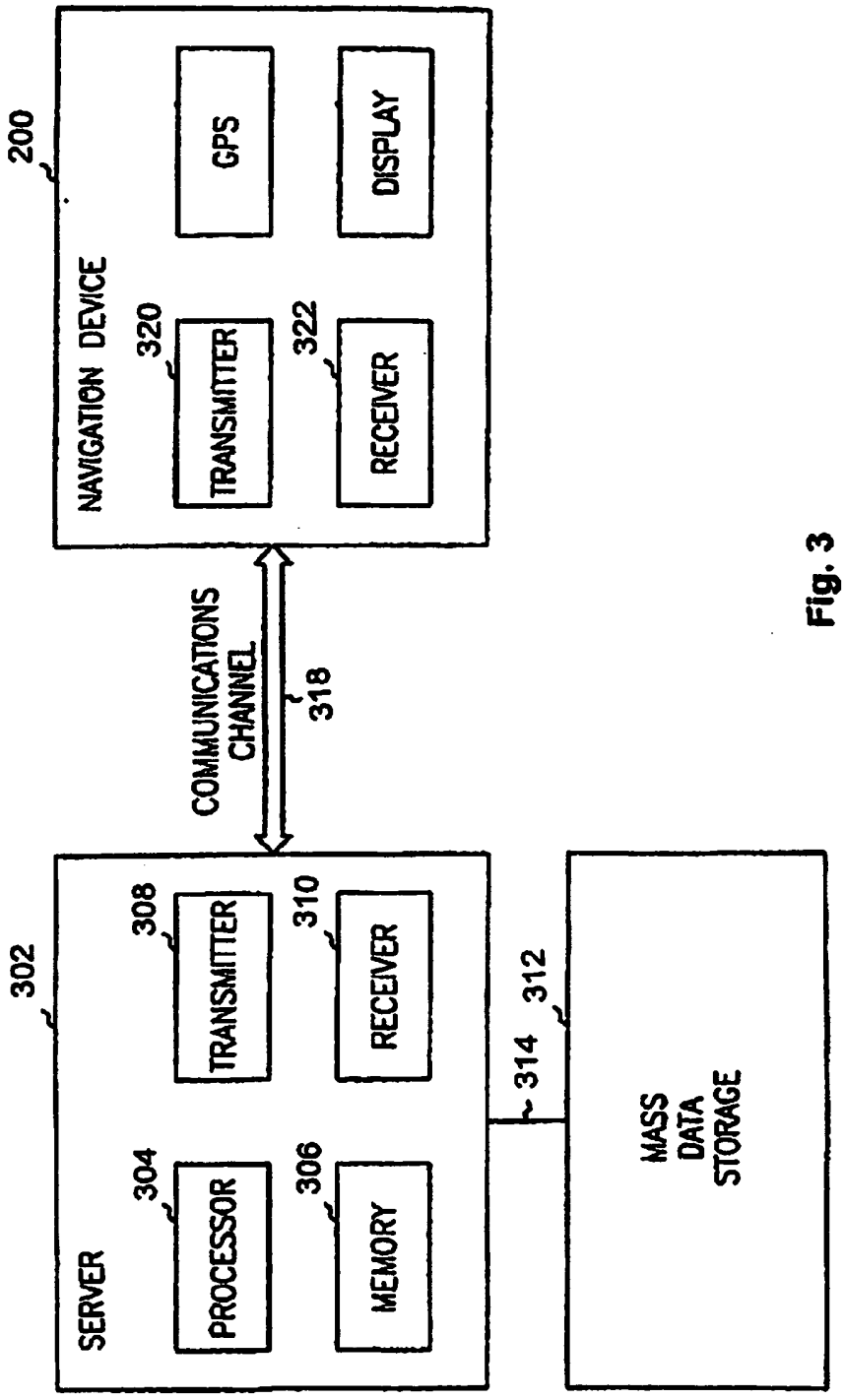
200
NAVIGATION DEVICE
GPS
DISPLAY
320
TRANSMITTER
322
RECEIVER
COMMUNICATIONS CHANNEL
318
302
SERVER
308
TRANSMITTER
310
RECEIVER
304
PROCESSOR
306
MEMORY
314
312
MASS DATA STORAGE

Fig. 3

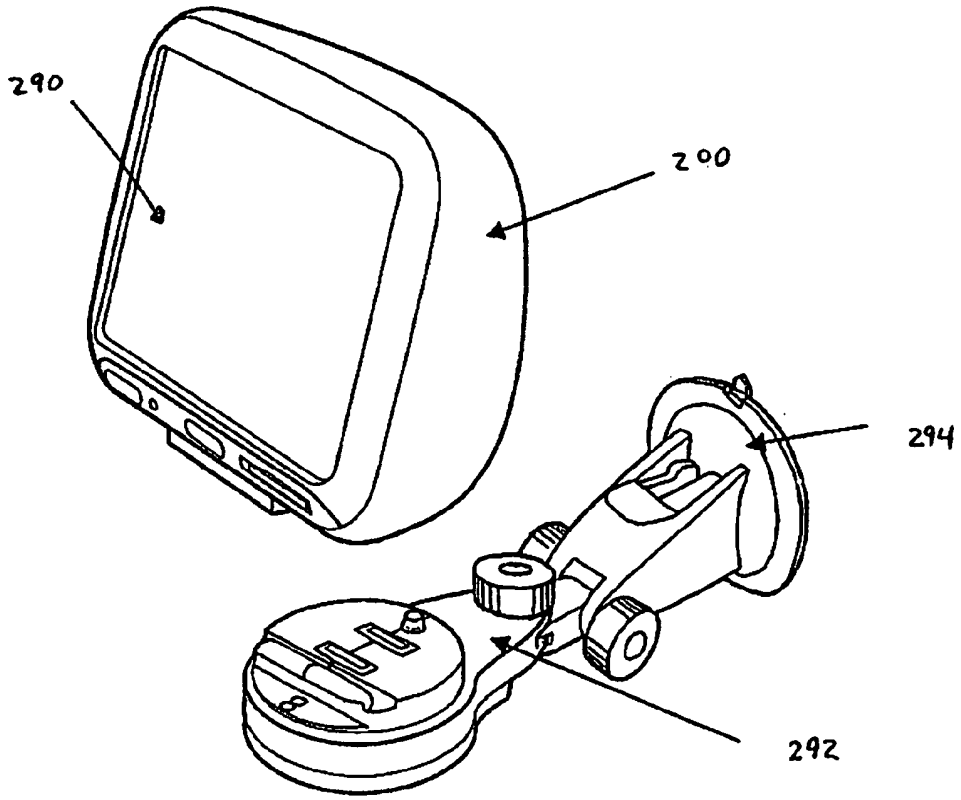


Figure 4A

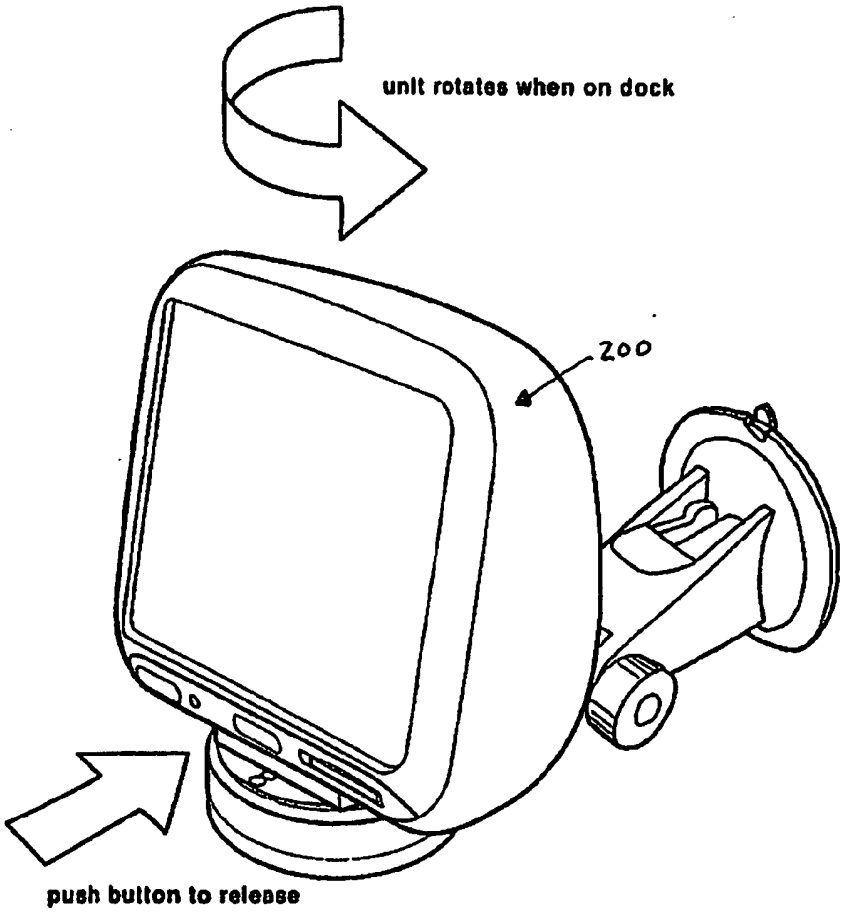


Figure 4B

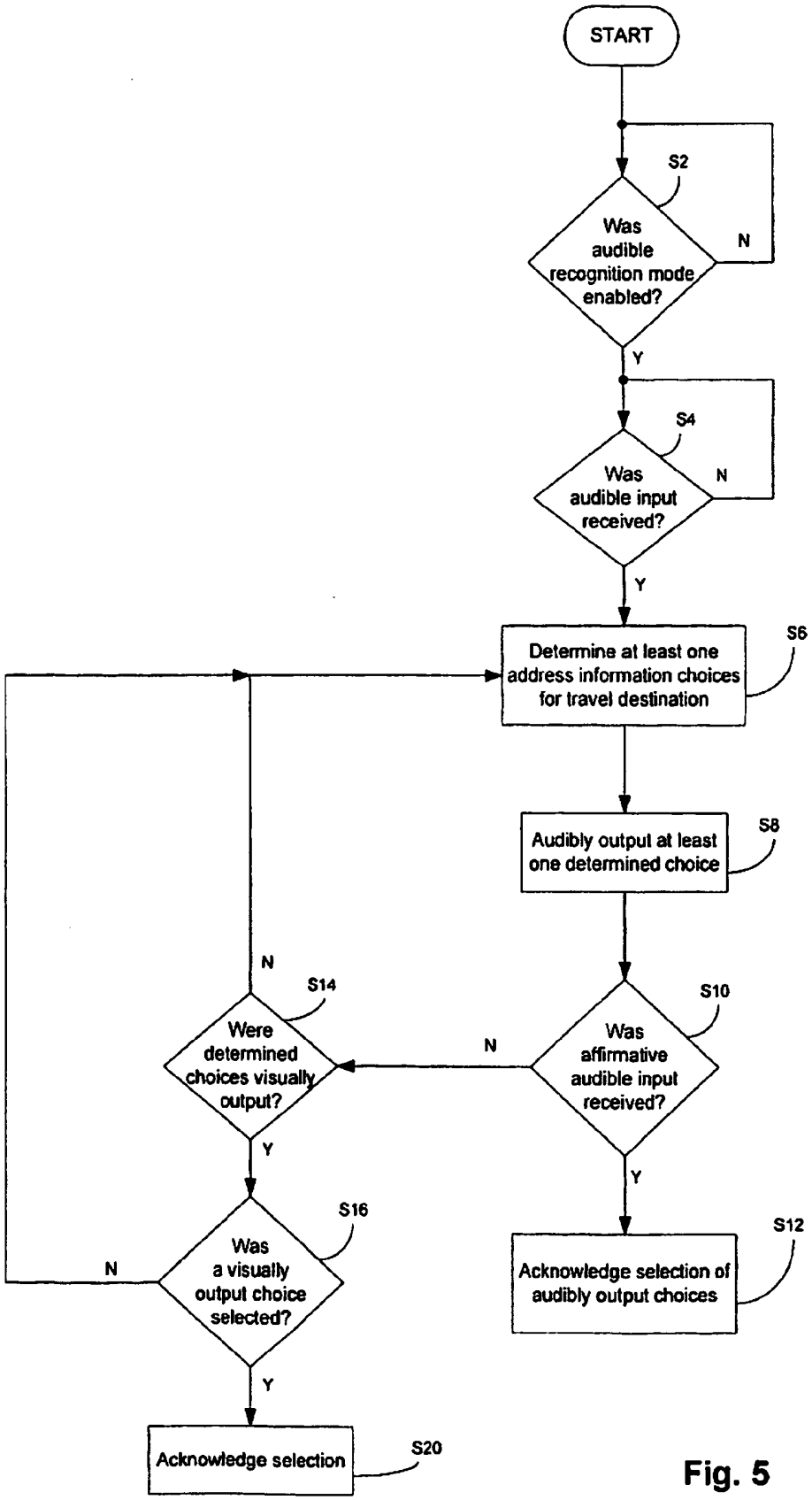
START
S2
Was audible recognition mode enabled?
N
Y
S4
Was audible input received?
N
Y
S6
Determine at least one address information choices for travel destination
S8
Audibly output at least one determined choice
S10
Was affirmative audible input received?
N
S14
Were determined choices visually output?
N
Y
S16
Was a visually output choice selected?
N
Y
S12
Acknowledge selection of audibly output choices
S20
Acknowledge selection

Fig. 5

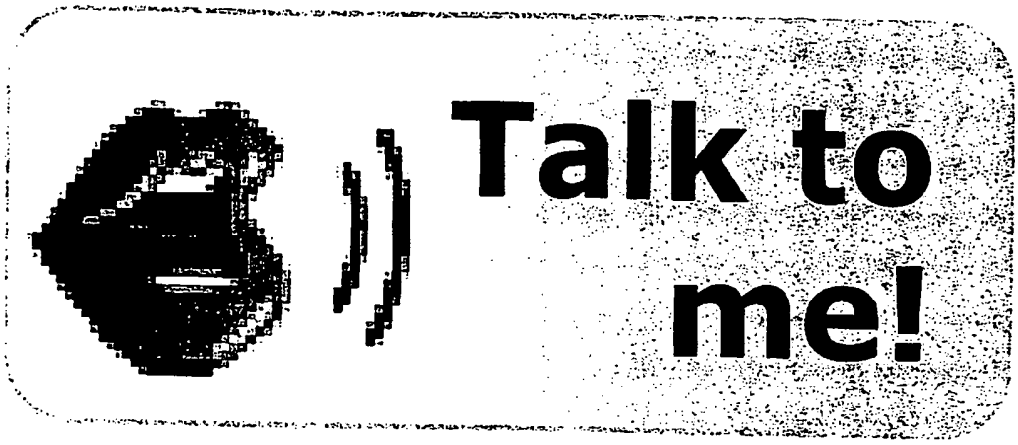


Fig. 6A

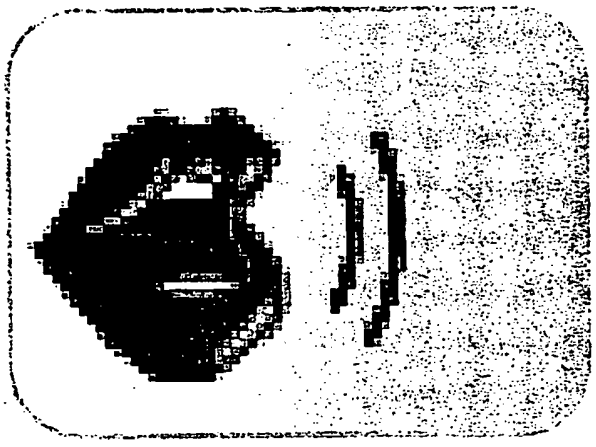

Fig. 6B

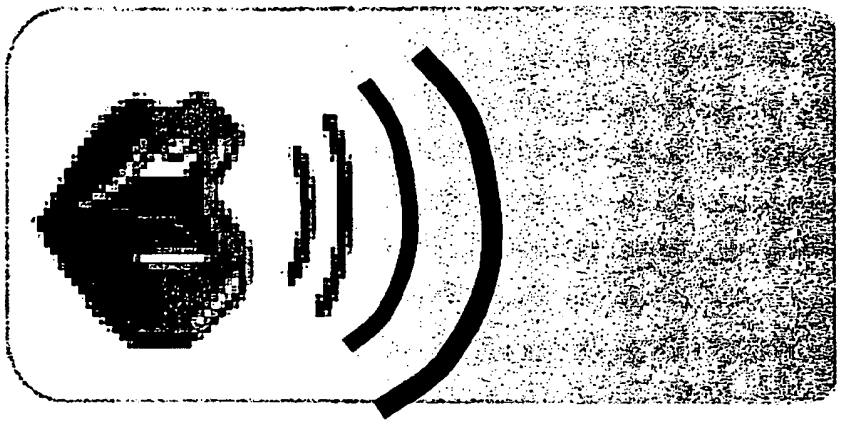

Fig. 6C

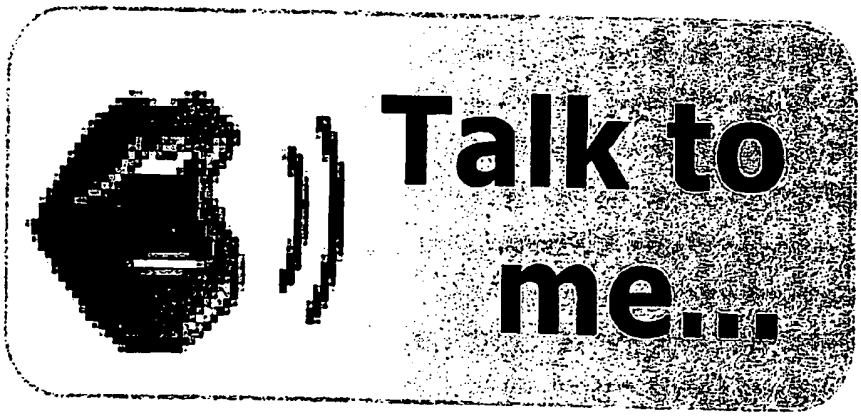


Fig. 6D

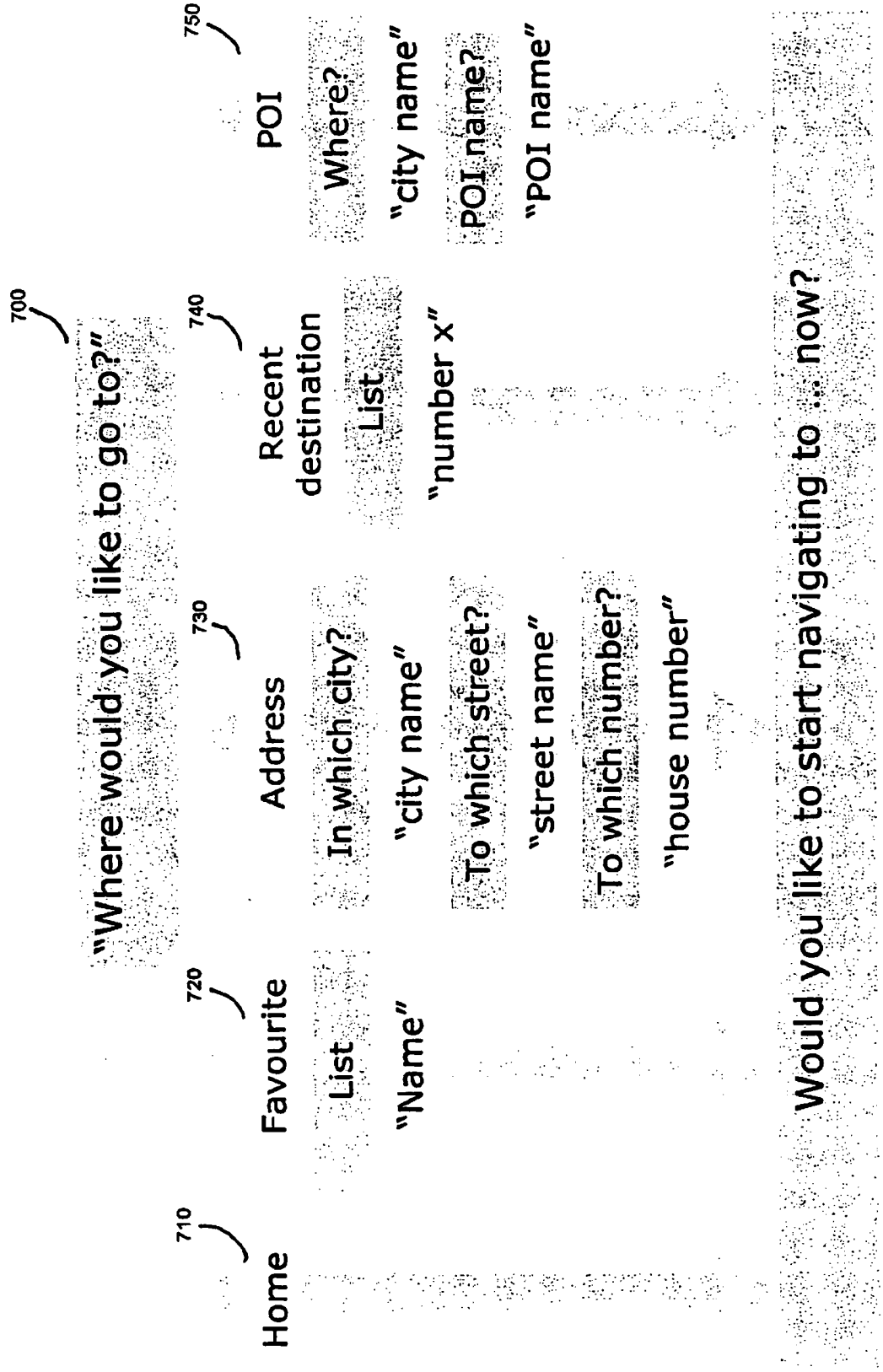
700
"Where would you like to go to?"
710
Home
720
Favourite
List
"Name"
730
Address
In which city?
"city name"
To which street?
"street name"
To which number?
"house number"
740
Recent destination
List
"number x"
750
POI
Where?
"city name"
POI name?
"POI name"
Would you like to start navigating to ... now?

*Fig. 7*

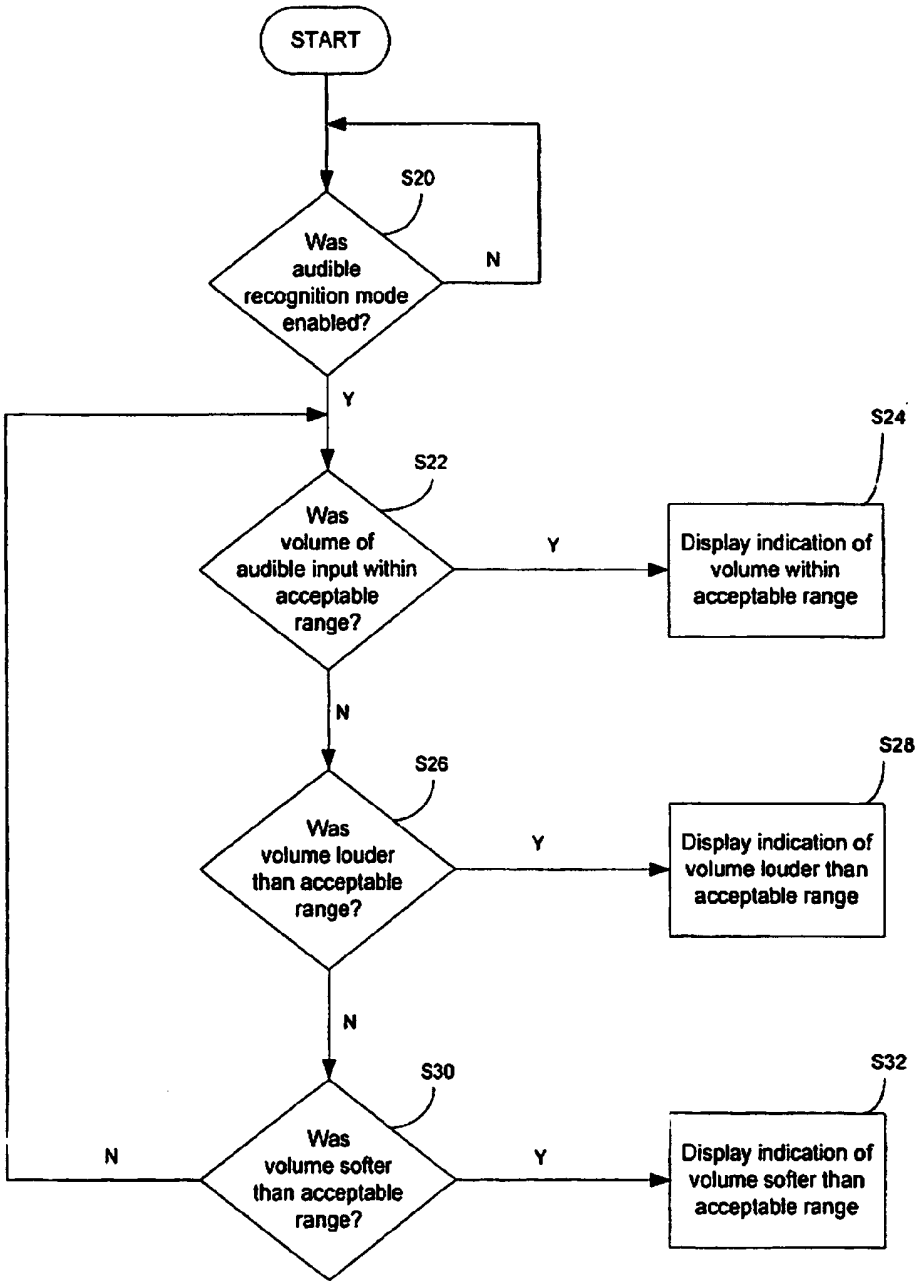
START
S20
Was audible recognition mode enabled?
N
Y
S22
Was volume of audible input within acceptable range?
Y
S24
Display indication of volume within acceptable range
N
S26
Was volume louder than acceptable range?
Y
S28
Display indication of volume louder than acceptable range
N
S30
Was volume softer than acceptable range?
N
Y
S32
Display indication of volume softer than acceptable range

Fig. 8

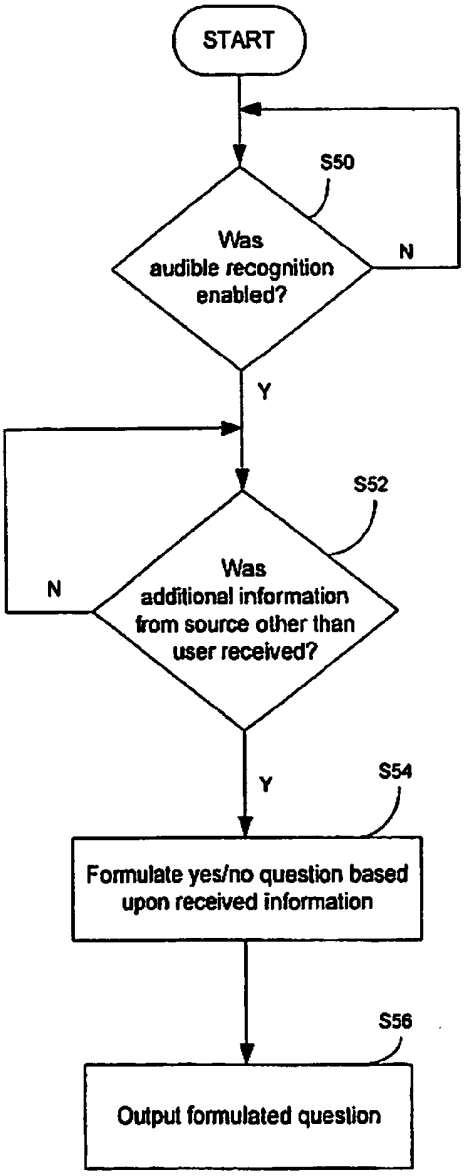
START
S50
Was audible recognition enabled?
N
Y
S52
Was additional information from source other than user received?
N
Y
S54
Formulate yes/no question based upon received information
S56
Output formulated question

Fig. 9

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/008715

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01C21/36

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)
G01C

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | EP 1 403 618 A (BOSCH GMBH ROBERT [DE])<br>31 March 2004 (2004-03-31)<br>column 1, line 5, paragraph 1 - column 7, line 39, paragraph 20; figures 1,2 | 1-25 |
| X | US 2006/058947 A1 (SCHALK THOMAS B [US])<br>16 March 2006 (2006-03-16)<br>page 1, paragraph 5 - page 4, paragraph 32; figures 1-5 | 1-25 |
| X | DE 101 25 825 A1 (BOSCH GMBH ROBERT [DE])<br>28 November 2002 (2002-11-28)<br>column 1, line 5, paragraph 1 - column 6, line 19, paragraph 24; figures 1-3 | 1-25 |
| X | EP 1 519 153 A (AISIN AW CO [JP])<br>30 March 2005 (2005-03-30)<br>column 3, line 41, paragraph 19 - column 20, line 30, paragraph 91; figures 1-7 | 1-25 |

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

☒ See patent family annex.

* Special categories of cited documents :

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"E" earlier document but published on or after the international filing date

"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 | Date of mailing of the international search report |
|---|---|
| 11 March 2008 | 19/03/2008 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL – 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Springer, Oliver |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2007/008715

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
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| US 2006058947 A1 | 16-03-2006 | CA 2579620 A1 | 23-03-2006 |
| | | EP 1792140 A2 | 06-06-2007 |
| | | WO 2006031804 A2 | 23-03-2006 |
| DE 10125825 A1 | 28-11-2002 | FR 2825179 A1 | 29-11-2002 |
| | | IT MI20021079 A1 | 21-11-2003 |
| EP 1519153 A | 30-03-2005 | CN 1603750 A | 06-04-2005 |
| | | JP 2005106496 A | 21-04-2005 |
| | | US 2005182561 A1 | 18-08-2005 |

[19] 中华人民共和国国家知识产权局

[51] Int. Cl.
*G01C 21/36* (2006.01)

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[43] 公开日 2010 年 2 月 3 日

[11] 公开号 CN 101641569A

[22] 申请日 2007.10.19
[21] 申请号 200780049438.7
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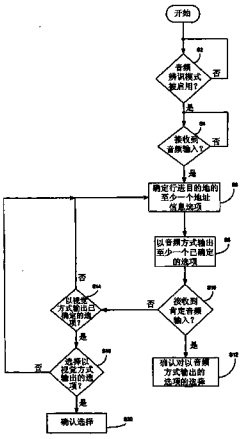
[32] 2007. 1.10 [33] US [31] 60/879,549
[32] 2007. 1.10 [33] US [31] 60/879,553
[32] 2007. 1.10 [33] US [31] 60/879,523
[32] 2007. 1.10 [33] US [31] 60/879,577
[32] 2007. 1.10 [33] US [31] 60/879,601
[32] 2007. 1.10 [33] US [31] 60/879,599
[32] 2007. 1.10 [33] US [31] 60/879,529
[86] 国际申请 PCT/EP2007/008715 2007.10.19
[87] 国际公布 WO2008/083736 英 2008.7.17
[85] 进入国家阶段日期 2009.7.7
[71] 申请人 通腾科技股份有限公司
地址 荷兰阿姆斯特丹
[72] 发明人 彼得·格尔林 马雷杰·罗森
[74] 专利代理机构 北京律盟知识产权代理有限责任公司
代理人 刘国伟
权利要求书 3 页 说明书 20 页 附图 11 页

[54] 发明名称

导航装置、操作包含音频辨识模式的所述导航装置的方法和计算机程序

[57] 摘要

一种操作导航装置的方法，其包括：接收对启用所述导航装置中的音频辨识模式的指示；基于接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以音频方式输出所述至少一个已确定的选项；以及在接收到肯定音频输入后，确认对所述音频方式输出的选择。 所述导航装置包括处理器、存储器、麦克风、用户输入构件和视觉显示器，用以接收对启用音频辨识模式的指示且用以基于接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以及输出装置，用以以音频方式输出所述至少一个已确定的选项，所述处理器进一步可用以在接收到肯定音频输入后，确认对所述至少一个已确定选项的所述音频方式输出的选择。



1. 一种操作导航装置的方法，其特征在于

确实地确定音频辨识模式在导航装置中被启用，

接收音频输入，

处理所述音频输入以及来自不同于所述导航装置的用户的来源的额外信息两者，

基于所述音频输入和所述额外信息来制定至少一个响应，以及

通过视觉、视觉音频和无线信号发射构件中的至少一者来输出所述响应。

2. 根据权利要求 1 所述的方法，其中所述额外信息为行进目的地的地址信息，且一个响应为地址信息的基于所述音频输入而确定的至少一个选项，所述导航装置以音频方式输出所述响应，且随后在接收到另外的肯定音频输入后确认所述响应。

3. 根据权利要求 1 或 2 所述的方法，其中所述响应为多个行进目的地，所述多个行进目的地每一者具有地址信息，且其中以视觉方式输出所述多个行进目的地中的每一者的地址信息，且以音频方式输出所述多个行进目的地中的仅一者。

4. 根据权利要求 3 所述的方法，其中以视觉方式输出所述多个行进目的地中的每一者的所述地址信息，以供在所述导航装置的集成式输入与显示装置上选择，可经由接收对触摸面板输入的指示来选择所述行进目的地中的每一者。

5. 根据任一前述权利要求所述的方法，其中制定多个响应，且随后可通过音频输入来选择所述多个响应。

6. 根据权利要求 5 所述的方法，其中对所述多个输出响应中的一者的所述选择可通过以音频方式输入对应于所述响应中的一者的编号来选择。

7. 根据权利要求 2 或从属于其的任一所述的方法，其中地址信息的所述至少一个已确定的选项包括城市名称。

8. 根据权利要求 7 所述的方法，其中在选择城市名称后且在接收到另一音频输入后，确定呈至少一个街道名称形式的另外的地址信息。

9. 根据权利要求 8 所述的方法，其中确定多个街道名称，以视觉方式输出所述多个街道名称，且以音频方式输出来自所述多个街道名称的仅一个街道名称。

10. 根据任一前述权利要求所述的方法，其中所述额外信息为音量等级阈值信息，且一个响应为关于所述接收到的音频输入的音量在可接受范围内、比所述可接受范围高还是比所述可接受范围低的指示。

11. 根据权利要求 10 所述的方法，其中以视觉方式输出所述响应，且所述响应包括用以显示所述指示的颜色信息的显示。

12. 根据权利要求 11 所述的方法，其中黄色用以指示所述接收到的音频输入比所述可接受范围低，其中红色用以指示所述接收到的音频输入比所述可接受范围高，且其中绿色用以指示所述接收到的音频输入在可接受范围内。

13. 根据任一前述权利要求所述的方法，其中所述响应为可基于所述接收到的额外信息由来自所述用户的是或否回答来回答的问题。

14. 根据权利要求 13 所述的方法，其中所述信息包括交通信息。

15. 根据权利要求 13 或 14 所述的方法，其中所述信息包括传入呼叫和消息中的至少一者的接收。

16. 根据权利要求 13 到 15 中任一所述的方法，其中所述问题的所述制定包括基于所述接收到的信息将信息插入到所述问题中，以及所述信息的可检索存储。

17. 根据权利要求 16 所述的方法，其中所述问题的所述制定包括插入关于计算出的交通延迟的信息。

18. 根据权利要求 16 所述的方法，其进一步包含在接收到来自所述用户的是回答后执行后续动作。

19. 根据权利要求 16 所述的方法，其进一步包含在接收到来自所述用户的关于所述计

算出的交通延迟的“是”回答后计算新的行进路线。

20. 一种计算机程序，其包含当在计算机上运行时适于执行根据权利要求 1 到 19 中任一所述的所有步骤的计算机程序代码构件。

21 一种根据权利要求 20 所述的计算机程序，其被包含在计算机可读媒体上或计算机可读媒体中。

22. 一种导航装置，其经编程以完成根据权利要求 1 到 19 所述的方法中的任一者且包含：

处理器，

存储器，

麦克风，

用户输入构件，

视觉显示器，以及

音频输出构件。

23. 根据权利要求 22 所述的导航装置，其中所述用户输入构件与视觉显示器集成在触敏式视觉显示器中，借助于所述触敏式视觉显示器，可显示信息且随后选择信息。

24. 根据权利要求 22 或 23 所述的导航装置，其中所述导航装置是便携式的。

25. 根据权利要求 22 或从属于其的任一所述的导航装置，其中所述视觉显示器为彩色显示器。

# 导航装置、操作包含音频辨识模式的所述导航装置的方法和计算机程序

## 技术领域

本申请大体上涉及导航方法和装置。

## 背景技术

导航装置传统上主要用于交通工具使用领域中，例如用于汽车、摩托车、卡车、船等上。或者，如果所述导航装置为便携式的，那么其可进一步在交通工具之间转移且/或可用于交通工具外部，例如用于徒步行进。

这些装置通常经特制以基于导航装置的初始位置和选定/输入的行进目的地（终点位置）来产生行进路线，请注意，所述初始位置可被键入到所述装置中，但传统上经由来自导航装置内的 GPS 接收器的 GPS 定位来计算。为辅助路线的导航，可沿着所述路线向导航装置的用户输出指令。这些指令可以是音频指令和视觉指令中的至少一者。

## 发明内容

本发明人发现，导航装置的用户在操作和检视触摸面板屏幕的过程中可能具有某些困难。因此，本发明人发现，用户希望至少在有限程度上不用手来接取，尤其是在运输工具中使用导航装置时。如此，本发明人开发出通过利用音频辨识模式来允许不用手或至少部分地不用手来接取的方法。

在本申请的至少一个实施例中，一种方法包括：接收对启用导航装置中的音频辨识模式的指示；在接收到对启用所述音频辨识模式的指示后且在接收到音频输入后，基于所述接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以音频方式输出关于行进目的地的地址信息的至少一个已确定的选项；以及在接收到肯定音频输入后，确认对以音频方式输出的至少一个已确定选项的选择。

在本申请的至少一个实施例中，一种导航装置包括：处理器，用以接收对启用导航装置中的音频辨识模式的指示，且用以在接收到音频输入后，基于所述接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以及输出装置，用以以音频方式输出关于行进目的地的地址信息的至少一个已确定的选项，所述处理器可进一步用以在

接收到肯定音频输入后，确认对以音频方式输出的至少一个已确定选项的选择。

在本申请的至少一个其它实施例中，一种方法包括：接收对启用导航装置中的音频辨识模式的指示；以及在接收到对启用所述音频辨识模式的指示后，在集成式输入与显示装置上显示关于接收到的音频输入的音量是在可接受范围内、比所述可接受范围高还是比所述可接受范围低的指示。

在本申请的至少一个其它实施例中，一种导航装置包括：处理器，用以接收对启用导航装置中的音频辨识模式的指示；以及集成式输入与显示装置，用以在所述处理器接收到对启用所述音频辨识模式的指示后，显示关于接收到的音频输入的音量是在可接受范围内、比所述可接受范围高还是比所述可接受范围低的指示。

在本申请的至少一个其它实施例中，一种方法包括：接收对启用导航装置中的音频辨识模式的指示；从不同于所述导航装置的用户的来源接收额外信息；基于所述接收到的额外信息来制定可由来自用户的是或否回答来回答的问题；以及向用户输出所制定的问题。

在本申请的至少一个其它实施例中，一种导航装置包括：处理器，用以接收对启用音频辨识模式的指示，用以从不同于所述导航装置的用户的来源接收额外信息，且用以基于所述接收到的额外信息来制定可由来自所述用户的是或否回答来回答的问题；以及输出装置，用以向用户输出所制定的问题。

## 附图说明

下文将通过使用实例性实施例来更详细地描述本申请，将借助于附图来解释所述实例性实施例，在附图中：

图 1 说明全球定位系统（GPS）的实例性视图；

图 2 说明本申请的实施例的导航装置的电子组件的实例性框图；

图 3 说明本申请的实施例的服务器、导航装置及其间连接的实例性框图；

图 4A 和图 4B 是导航装置的实施例的实施方案的透视图；

图 5 说明本申请的方法的实施例的流程图；

图 6A 到图 6D 是本申请的实施例中的用于显示的音频辨识模式图标的实例；

图 7 说明本申请的实施例的实例图；

图 8 说明本申请的方法的实施例的流程图；以及

图 9 说明本申请的方法的实施例的流程图。

## 具体实施方式

本文中使用的术语仅用于描述特定实施例的目的，且并不希望限制本发明。如本文中所使用，单数形式“一”和“所述”希望还包括复数形式，除非上下文另外清楚地指出。将进一步了解到，术语“包括”在用于本说明书中时指定所陈述的特征、整体、步骤、操作、元件和/或组件的存在，但并不排除一个或一个以上其它特征、整体、步骤、操作、元件、组件和/或其群组的存在或添加。

在描述图式中所说明的实例性实施例的过程中，为了清楚起见，采用特定术语。然而，本专利说明书的揭示内容并不希望限于如此选定的特定术语，且应了解，每一特定元件包括以类似方式操作的所有技术等效物。

下文中参看图式来描述本专利申请案的实例性实施例，其中在若干视图中相同参考数字始终表示相同或对应的部分。相同数字始终指代相同元件。如本文中所使用，术语“和/或”包括相关联的所列项目中的一者或一者以上的任何和所有组合。

图 1 说明可由导航装置使用的全球定位系统（GPS）的实例性视图，所述导航装置包括本申请的实施例的导航装置。所述系统为已知的且用于多种用途。一般来说，GPS 为基于卫星无线电的导航系统，其能够为无限数目个用户确定连续位置、速度、时间和（在一些例子中）方向信息。

先前称为 NAVSTAR 的 GPS 并入有在极其精确的轨道中与地球一起运转的多个卫星。基于这些精确轨道，GPS 卫星可将其位置中继到任何数目个接收单元。

当经专门装备以接收 GPS 数据的装置开始扫描射频以查找 GPS 卫星信号时实施 GPS 系统。在从 GPS 卫星接收到无线电信号后，所述装置经由多种不同常规方法中的一者来确定所述卫星的精确位置。在大多数情况下，所述装置将继续扫描以查找信号，直到其已获得至少三个不同的卫星信号为止（请注意，通常并不（但可以）使用其它三角测量技术用仅两个信号来确定位置）。通过实施几何三角测量，接收器利用三个已知位置来确定其自身相对于卫星的二维位置。这可以已知方式来完成。另外，获得第四卫星信号将允许接收装置通过相同的几何计算以已知方式来计算其三维位置。位置和速度数据可由无限数目个用户连续地实时更新。

如图 1 中所示，GPS 系统大体上由参考数字 100 表示。多个卫星 120 处于围绕地球 124 的轨道中。每一卫星 120 的轨道未必与其它卫星 120 的轨道同步，且实际上很可能不同步。可用于本申请的导航装置的实施例中的 GPS 接收器 140 经展示为从各种卫星 120 接收扩频 GPS 卫星信号 160。

从每一卫星 120 连续地发射的扩频信号 160 利用使用极其准确的原子钟实现的高度准确的频率标准。每一卫星 120 作为其数据信号发射 160 的一部分而发射指示所述特定卫星 120 的数据流。相关领域的技术人员了解到，GPS 接收器装置 140 通常获得来自至少三个卫星 120 的扩频 GPS 卫星信号 160 以供所述 GPS 接收器装置 140 通过三角测量来计算其二维位置。额外信号的获得（其产生来自总共四个卫星 120 的信号 160）准许 GPS 接收器装置 140 以已知方式来计算其三维位置。

图 2 以方框组件格式来说明本申请的实施例的导航装置 200 的电子组件的实例性框图。应注意，导航装置 200 的框图并不包括所述导航装置的所有组件，而是仅表示许多实例性组件。

导航装置 200 位于外壳（未图标）内。所述外壳包括连接到输入装置 220 和显示屏幕 240 的处理器 210。输入装置 220 可包括键盘装置、语音输入装置、触摸面板和/或用于输入信息的任何其它已知输入装置；且显示屏幕 240 可包括任何类型的显示屏幕，例如 LCD 显示器。在本申请的至少一个实施例中，输入装置 220 与显示屏幕 240 经集成为集成式输入与显示装置，所述集成式输入与显示装置包括触摸垫或触摸屏输入端，其中用户仅需触摸显示屏幕 240 的一部分便可选择多个显示选项中的一者或激活多个虚拟按钮中的一者。

此外，其它类型的输出装置 241 还可包括（包括但不限于）音频输出装置。因为输出装置 241 可向导航装置 200 的用户产生音频信息，所以同样应了解，输入装置 240 还可包括麦克风以及用于接收输入语音命令的软件。

在导航装置 200 中，处理器 210 经由连接 225 而操作性地连接到输入装置 240 且经设置以经由连接 225 从输入装置 240 接收输入信息，且经由输出连接 245 而操作性地连接到显示屏幕 240 和输出装置 241 中的至少一者以将信息输出到所述至少一者。另外，处理器 210 经由连接 235 而操作性地连接到存储器 230，且进一步适于经由连接 275 从输入/输出（I/O）端口 270 接收信息/将信息发送到输入/输出（I/O）端口 270，其中 I/O 端口 270 可连接到在导航装置 200 外部的 I/O 装置 280。外部 I/O 装置 270 可包括（但不限于）外部收听装置，例如耳机。到 I/O 装置 280 的连接可进一步为到任何其它外部装置（例如汽车立体声单元）的有线或无线连接，以用于不用手的操作和/或用于（例如）语音激活式操作，用于到耳机或头戴式耳机的连接和/或用于到（例如）移动电话的连接，其中移动电话连接可用以在导航装置 200 与（例如）因特网或任何其它网络之间建立数据连接且/或用以经由（例如）因特网或某其它网络建立到服务器的连接。

在至少一个实施例中，导航装置 200 可经由移动装置 400（例如移动电话、PDA 和

/或具有移动电话技术的任一装置）建立与服务器 302 的“移动”网络连接，从而建立数字连接（例如经由（例如）已知的蓝牙技术的数字连接）。此后，通过其网络服务提供者，移动装置 400 可建立与服务器 302 的网络连接（例如，通过因特网）。如此，在导航装置 200（当其独自且/或在交通工具中行进时，其可为且通常为移动的）与服务器 302 之间建立“移动”网络连接以便为信息提供“实时”或至少非常“新式的”网关。

使用（例如）因特网 410 来建立移动装置 400（经由服务提供者）与例如服务器 302 等另一装置之间的网络连接可以已知方式来完成。举例来说，这可包括 TCP/IP 分层协议的使用。移动装置 400 可利用任何数目个通信标准，例如 CDMA、GSM、WAN 等。

如此，可利用经由数据连接（例如，经由移动电话或导航装置 200 内的移动电话技术）所实现的因特网连接。对于此连接，建立服务器 302 与导航装置 200 之间的因特网连接。这可（例如）通过移动电话或其它移动装置和 GPRS（通用分组无线电服务）连接（GPRS 连接是由电信运营商提供的用于移动装置的高速数据连接；GPRS 是用以连接到因特网的方法）来完成。

导航装置 200 可进一步经由（例如）现有的蓝牙技术以已知方式来完成与移动装置 400 的数据连接且最终完成与因特网 410 和服务器 302 的数据连接，其中数据协议可利用任何数目个标准，例如 GSRM、用于 GSM 标准的数据协议标准。

导航装置 200 可在导航装置 200 本身内包括其自身的移动电话技术（例如，包括天线，其中可进一步替代地使用导航装置 200 的内部天线）。导航装置 200 内的移动电话技术可包括如上指定的内部组件，且/或可包括可插入式卡，连同（例如）必要的移动电话技术和/或天线。如此，导航装置 200 内的移动电话技术可类似地经由（例如）因特网 410 以与任一移动装置 400 的方式类似的方式来建立导航装置 200 与服务器 302 之间的网络连接。

对于 GPRS 电话设置，具备蓝牙功能的装置可用以配合移动电话模型、制造商等的不断改变的频谱正确地工作，举例来说，模型/制造商特定设置可存储于导航装置 200 上。可以在先前或随后实施例中的任一者中所论述的方式来更新针对此信息而存储的数据。

图 2 进一步说明处理器 210 与天线/接收器 250 之间经由连接 255 的操作性连接，其中天线/接收器 250 可为（例如）GPS 天线/接收器。将了解到，为了说明而示意性地组合由参考数字 250 表示的天线与接收器，但天线和接收器可为分开定位的组件，且天线可为（例如）GPS 片状天线或螺旋天线。

另外，所属领域的技术人员将了解，以常规方式由电源（未图标）向图 2 中所示的

电子组件供电。如所属领域的技术人员将了解的，图 2 中所示的组件的不同配置被视为属于本申请的范围内。举例来说，在一个实施例中，图 2 中所示的组件可经由有线和/或无线连接等相互通信。因此，本申请的导航装置 200 的范围包括便携式或手持式导航装置 200。

此外，图 2 的便携式或手持式导航装置 200 可以已知方式连接或“对接”到机动交通工具，例如汽车或船。接着可将此导航装置 200 从对接位置移除以用于便携式或手持式导航用途。

图 3 说明本申请的实施例的服务器 302 与本申请的导航装置 200（经由一般通信信道 318）的实例性框图。当在服务器 302 与本申请的导航装置 200 之间建立经由通信信道 318 的连接（请注意，此连接可为经由移动装置的数据连接、经由个人计算机经由因特网的直接连接等）时，服务器 302 与导航装置 200 可通信。

除了可能未说明的其它组件之外，服务器 302 还包括处理器 304，所述处理器 304 操作性地连接到存储器 306 且经由有线或无线连接 314 进一步操作性地连接到大容量数据存储装置 312。处理器 304 进一步操作性地连接到发射器 308 和接收器 310，以经由通信信道 318 将信息发射到导航装置 200 且从导航装置 200 发送信息。所发送和所接收的信号可包括数据、通信和/或其它传播信号。可根据对于导航系统 200 的通信设计中所使用的通信要求和通信技术来选择或设计发射器 308 和接收器 310。另外，应注意，可将发射器 308 和接收器 310 的功能组合为信号收发器。

服务器 302 进一步连接到（或包括）大容量存储装置 312，请注意，大容量存储装置 312 可经由通信链路 314 耦合到服务器 302。大容量存储装置 312 含有大量导航数据和地图信息，且可同样为与服务器 302 分离的装置，或者可并入到服务器 302 中。

导航装置 200 适于通过通信信道 318 而与服务器 302 通信，且包括如先前关于图 2 所描述的处理器、存储器等以及发射器 320 和接收器 322 以通过通信信道 318 发送和接收信号和/或数据，请注意，这些装置可进一步用于与不同于服务器 302 的装置进行通信。另外，根据对于导航装置 200 的通信设计中所使用的通信要求和通信技术来选择或设计发射器 320 和接收器 322，且可将发射器 320 和接收器 322 的功能组合为单一收发器。

存储于服务器存储器 306 中的软件为处理器 304 提供指令且允许服务器 302 向导航装置 200 提供服务。由服务器 302 提供的一个服务涉及处理来自导航装置 200 的请求和将导航数据从大容量数据存储装置 312 发射到导航装置 200。根据本申请的至少一个实施例，由服务器 302 提供的另一服务包括针对所需应用使用各种算法来处理导航数据和将这些计算的结果发送到导航装置 200。

通信信道 318 一般表示连接导航装置 200 与服务器 302 的传播媒体或路径。根据本申请的至少一个实施例，服务器 302 和导航装置 200 两者均包括用于通过所述通信信道发射数据的发射器和用于接收已通过所述通信信道发射的数据的接收器。

通信信道 318 不限于特定通信技术。另外，通信信道 318 不限于单一通信技术；也就是说，信道 318 可包括使用多种技术的若干通信链路。举例来说，根据至少一个实施例，通信信道 318 可适于提供用于电通信、光通信和/或电磁通信等的路径。如此，通信信道 318 包括（但不限于）以下各项中的一者或其组合：电路、例如电线和同轴电缆等电导体、光纤电缆、转换器、射频（rf）波、大气、真空等。此外，根据至少一个各种实施例，通信信道 318 可包括中间装置，例如路由器、转发器、缓冲器、发射器和接收器。

举例来说，在本申请的至少一个实施例中，通信信道 318 包括电话和计算机网络。此外，在至少一个实施例中，通信信道 318 可能能够适应例如射频、微波频率、红外通信等无线通信。另外，根据至少一个实施例，通信信道 318 可适应卫星通信。

通过通信信道 318 所发射的通信信号包括（但不限于）如给定通信技术可能要求或需要的信号。举例来说，所述信号可适于在蜂窝式通信技术中使用，所述蜂窝式通信技术例如为时分多址（TDMA）、频分多址（FDMA）、码分多址（CDMA）、全球移动通信系统（GSM）等。可通过通信信道 318 发射数字和模拟信号两者。根据至少一个实施例，这些信号可为如所述通信技术可能需要的经调制、经加密且/或经压缩的信号。

大容量数据存储装置 312 包括用于所需导航应用的足够存储量。大容量数据存储装置 312 的实例可包括磁性数据存储媒体（例如硬盘驱动器）、光学存储媒体（例如 CD-Rom）、带电数据存储媒体（例如快闪存储器）、分子存储器等。

根据本申请的至少一个实施例，服务器 302 包括可由导航装置 200 经由无线信道接入的远程服务器。根据本申请的至少一个其它实施例，服务器 302 可包括位于局域网（LAN）、广域网（WAN）、虚拟专用网络（VPN）等上的网络服务器。

根据本申请的至少一个实施例，服务器 302 可包括例如桌上型或膝上型计算机等个人计算机，且通信信道 318 可为连接在个人计算机与导航装置 200 之间的电缆。或者，可将个人计算机连接在导航装置 200 与服务器 302 之间以在服务器 302 与导航装置 200 之间建立因特网连接。或者，移动电话或其它手持式装置可建立到因特网的无线连接，以用于经由因特网将导航装置 200 连接到服务器 302。

可经由信息下载为导航装置 200 提供来自服务器 302 的信息，所述信息下载可在用户将导航装置 200 连接到服务器 302 后周期性地更新且/或可在经由（例如）无线移动连

接装置和 TCP/IP 连接在服务器 302 与导航装置 200 之间进行较恒定或频繁的连接后更具动态。对于许多动态计算，服务器 302 中的处理器 304 可用于处置大量的处理需要；然而，导航装置 200 的处理器 210 还可时常独立于到服务器 302 的连接而处置许多处理和计算。

连接到服务器 302 的大容量存储装置 312 可包括比能够维持于导航装置 200 本身上的数据更多量的制图和路线数据，包括地图等。举例来说，服务器 302 可使用一组处理算法来处理导航装置 200 的沿着所述路线行进的大部分装置。另外，存储于存储器 312 中的制图和路线数据可对原先由导航装置 200 接收到的信号（例如，GPS 信号）进行操作。

如以上在本申请的图 2 中所指示，本申请的实施例的导航装置 200 包括处理器 210、输入装置 220 和显示屏幕 240。在至少一个实施例中，输入装置 220 与显示屏幕 240 经集成为集成式输入与显示装置以启用信息输入（经由直接输入、菜单选择等）和信息显示（例如通过触摸面板屏幕）两者。如所属领域的技术人员众所周知的，此屏幕可为（例如）触摸输入 LCD 屏幕。另外，导航装置 200 还可包括任何额外输入装置 220 和/或任何额外输出装置 241，例如音频输入/输出装置。

图 4A 和图 4B 是导航装置 200 的实施例的实际实施方案的透视图。如图 4A 中所示，导航装置 200 可为包括集成式输入与显示装置 290（例如，触摸面板屏幕）和图 2 的其它组件（包括但不限于内部 GPS 接收器 250、微处理器 210、电源、存储器系统 220 等）的单元。

导航装置 200 可搁置于臂 292 上，所述臂 292 本身可使用大吸盘 294 而紧固到交通工具仪表板/窗/等。此臂 292 为导航装置 200 可对接到的对接台的一个实例。

如图 4B 中所示，导航装置 200 可对接或通过（例如）将导航装置 292 搭扣连接到对接台的臂 292 来以其它方式连接到对接台的臂 292（此仅为一个实例，因为用于连接到对接台的其它已知替代方案属于本申请的范围内）。导航装置 200 可接着可在臂 292 上旋转，如图 4B 的箭头所示。为了释放导航装置 200 与对接台之间的连接，例如可按压导航装置 200 上的按钮（此仅为一个实例，因为用于与对接台断开连接的其它已知替代方案属于本申请的范围内）。

在本申请的至少一个实施例中，一种方法包括：接收对启用导航装置 200 中的音频辨识模式的指示；在接收到对启用所述音频辨识模式的指示后且在接收到音频输入后，基于所述接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以音频方式输出关于行进目的地的地址信息的至少一个已确定的选项；以及在接收到肯定音频

输入后，确认对以音频方式输出的至少一个已确定选项的选择。

在本申请的至少一个实施例中，一种导航装置 200 包括：处理器 210，用以接收对启用导航装置 200 中的音频辨识模式的指示，且用以在接收到音频输入后，基于所述接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以及输出装置 241，用以以音频方式输出关于行进目的地的地址信息的至少一个已确定的选项，所述处理器 210 可进一步用以在接收到肯定音频输入后，确认对以音频方式输出的至少一个选项的选择。

图 5 说明本申请的实例性实施例的流程图。在图 5 中所示的实施例中，首先在步骤 S2 中确定音频辨识模式是否已在导航装置中启用。举例来说，如图 6A 中所示，图标可显示于导航装置 200 的集成式输入与显示装置 290 上。此图标可在输入/选择目的地以用于建立行进路线之前显示于初始菜单或后续菜单中以供选择，且/或可（例如）在以导航模式使用导航装置期间与地图信息一起显示。此图标可仅包括图示说明（例如，图 6A 中所示的嘴唇），且/或可包括文字，所述文字指示按钮对应于音频辨识模式，例如音频话音辨识（ASR）。在导航装置 200 的处理器 210 接收到对选择如图 6A 中所示的图标的指示后，音频辨识模式可由处理器 210 启用。

音频辨识模式可包括处理器 210 结合 ASR 引擎或模块一起工作。此 ASR 引擎或模块是软件引擎，一旦音频辨识模式如上文所阐释那样被启用，所述软件引擎就可被加载（例如）以导航装置 200 的用户的国家（或例如由用户选择）的语言表达的语法规则。因此，导航装置 200 的用户通常将键入/选择所述用户所在的国家，且接着处理器 210 可选择、输入或匹配所述国家的语言。其后，在音频辨识模式被启用后，ASR 引擎可接着被装载来自存储器 230 的语法规则。ASR 引擎可接着使用对应于所选地图的语言来辨识地理名称（例如，城市名称和街道名称），且使用当前用户选择/启用的语言来辨识普通话音。举例来说，系统可经设置以启用对来自用户的复杂话音的辨识，或者可仅限于是、否、完成、返回和/或例如 1、2、3 等数字条目的简单答复。

ASR 引擎或模块是启用用户与导航装置 200 之间的话音接口的引擎或模块。此模块通常不可用于便携式导航装置 200（例如本申请的图 2 到图 4B 中所示的导航装置 200）中，但本申请的实施例改进或甚至优化（例如）处理器 210 与存储器装置 230 之间的存储器管理，以及数据结构，以允许 ASR 模块处置并辨识输入信息。基本上，在话音辨识期间；即在音频辨识模式在图 5 的步骤 S2 中被启用后，导航装置 200 的存储器装置 230 中的所有或大多数可用存储器被分配给 ASR 模块，而处理器 210 的其它过程暂停。当然，在以导航模式使用导航装置 200 期间，专用于显示导航信息和输出导航指令的某

些过程必须继续，因此有时会使 ASR 模块的操作变慢。

在本申请的一个实例性实施例中，ASR 模块主要用于基于接收到的音频输入而选择行进目的地的地址信息，且因此通常在导航装置 200 不以导航模式使用时操作。在导航装置 200 以导航模式操作后，本申请的另一实施例涉及制定可由来自用户的（例如）是/否回答来回答的简单问题，以进而使处理能力能够被分配给导航模式，其中 ASR 模块中仅需要少量的处理能力来辨识来自导航装置 200 的用户的此些是/否回答。因此，尽管图 5 中所示的过程可在以导航模式使用导航装置 200 期间操作，但在足够的存储器 230 包括于导航装置 200 中后且/或在 ASR 模块被用来辨识（例如）是/否受限输入信息后，图 5 中所示的操作通常发生在导航装置 200 所在的运输工具的开动之前，即在将行进目的地输入到导航装置 200 中之前且在行进路线被确定之前。

返回参看图 5，在步骤 S2 中，如果音频辨识模式未被启用，那么系统循环返回以重复步骤 S2。然而，如果音频辨识模式被接收到（例如）对选择图 6A 中所示的“与我交谈”图标的指示的处理器 210 启用，那么语言和语法信息从存储器 230 加载到导航装置 200 的 ASR 模块中，且在步骤 S4 中，导航装置 200 仅等待音频输入。如果未接收到音频输入，那么系统仅循环返回以重复步骤 S4，直到接收到音频输入为止。

ASR 模块通常用来辨识来自不同用户的话音信息。此信息通常是不可预测的，且因此无法存储在存储器 230 中。ASR 模块或引擎结合处理器 210 而操作，以便以已知方式将接收到的话音信息转换为音素序列，且接着与处理器 210 合作以使所存储的城市、街道名称等的现有语法与经转换的音素序列相匹配。

在步骤 S6 中，如果接收到音频输入，那么处理器 210 与 ASR 模块合作以将输入话音转换为音素，且将音素序列与存储器 230 中所存储的信息进行比较，以基于接收到的音频输入而确定关于行进目的地的地址信息的至少一个选项。举例来说，在至少一个实施例中，关于行进目的地的地址信息的至少一个选项可包括城市名称。因此，用户可以音频方式输出城市名称，作为行进目的地的地址信息的一部分，其中可通过导航装置 200 显示键入行进目的地信息的请求（例如，“在哪一城市”）来提示对城市的初始输入。在接收到此音频信息后，处理器 210 和 ASR 模块如上文所述那样处理音素，且将此信息与存储器 230 中所存储的城市进行比较，以确定关于所输入的音频声音的至少一个选项（如果可能的话）。如果未辨识出任何东西，那么导航装置 200 可返回到提示输入城市或其它地址信息的屏幕，且可闪烁或可不闪烁，或者以其它方式显示（例如）消息“输入未被辨识”。如本申请的另一实施例中将阐释，还可向用户显示声音指示符，其（例如）指示音频输入的音量在可接受范围内、比可接受范围高还是比可接受范围低。

如果可在步骤 S6 中确定至少一个地址信息选项（例如，城市），那么过程进行到步骤 S8，在步骤 S8 中，以音频方式输出关于行进目的地的地址信息的至少一个已确定的选项。举例来说，代替于系统仅猜测音频输入被正确地接收到，处理器 210 在步骤 S8 中指导关于行进目的地的地址信息的至少一个已确定选项的音频输出。其后，在步骤 S10 中，处理器 210 等待以查看在步骤 S10 中是否接收到肯定音频输出。如果接收到肯定音频输出，那么处理器 210 和 ASR 模块可接着确认发生了正确的确定，且可因此在接收到并辨识肯定音频输入（例如，“是”）后，确认对以音频方式输出的至少一个已确定选项的选择。

因此，代替于处理器 210 和 ASR 模块仅猜测音频输入是正确的，首先以音频方式输出关于地址信息的至少一个已确定选项，且直到接收到肯定音频输入，才确认对所述至少一个已确定选项的选择。

如步骤 S6 中所陈述，在接收到音频输入后，确定行进目的地的至少一个地址信息选项，例如城市名称。然而，在本申请的至少一个实例性实施例中，处理器 210 辨识多个“N 最佳”选项（并非仅一个选项，注意，N 可为任一数目，例如六）。基本上，处理器 210 结合 ASR 模块而设法根据音频输入的音素来最佳地确定城市名称（例如，在地址信息的输入的此第一情况下）。处理器 210 扫描或检查存储在存储器 230 中的所有各个城市以寻找匹配。处理器 210 接着对最可能的匹配进行分级，使得最可能的匹配将作为关于行进目的地的地址信息的至少一个已确定选项以音频方式向导航装置 200 的用户输出。

因此，在步骤 S10 中的肯定音频输入后，可确认对以音频方式输出的至少一个已确定选项的选择。然而，因为可最初确定“N 最佳”城市，所以处理器 210 还可指导导航装置 200 在集成式输入与显示装置 290 上显示“N 最佳”选项列表，例如由处理器 210 确定的城市名称的 N 个最佳匹配。基于从用户接收到的音频输入的最可能匹配可以音频方式输出，且可进一步在“N 最佳”列表的顶部以视觉方式显示（作为所显示的列表中的第一号选项）。其后，在步骤 S14 中，可以视觉方式向用户显示接下来的最佳选项作为经编号选项（例如，选项二到六）。其后，在步骤 S16 中，可（例如）通过集成式输入与显示装置 290 经由显示和后续输入来选择以视觉方式输出的选项。如果选择了以视觉方式输出的选项，那么可在图 5 的步骤 S20 中通过（例如）处理器 210 来确认选择。

因此，处理器 210 和 ASR 模块可不仅用来确定单个选项，而且可用来确定关于行进目的地的地址信息的多个选项。举例来说，可以视觉方式输出所述多个选项中的每一者且可以音频方式输出仅一个选项。可以视觉方式输出所述多个选项，以供在导航装置

200 的集成式输入与显示装置 290 上进行选择。这些选项中的每一者（例如，听起来最像所述音频输入的城市的列表）可被确定并显示，且可由触摸面板和音频输出端中的至少一者选择。另外，经由接收触摸面板输入的指示，可进一步选择以音频方式输出至少一个选项。此外，经由接收触摸面板输入的指示且/或通过对应于所显示选项的编号的音频输入（例如，用户说“二”来选择第二个所显示选项），可选择多个已确定选项中的每一者。

作为一个非限制性实例，如果导航装置200的用户以音频方式输出城市“盐湖城（Salt Lake City）”，那么处理器 210 和 ASR 模块可确定待以音频和视觉方式输出的“N 最佳”城市列表。所显示的列表中的第一个城市可为“盐湖城”，且可在（例如）导航装置的集成式输入与显示装置 290 上以音频方式输出并以视觉方式输出。另外，处理器 210 和 ASR 模块可确定另外的“N 最佳”城市，包括（例如）五个其它城市，例如，塞勒姆（Salem）、萨克拉门托（Sacramento）、圣安东尼奥（San Antonio）、斯普林菲尔德（Springfield）和斯丹顿（Staunton）。在本申请的一个实例性实施例中，“N 最佳”列表包括固定数目个选项，例如，六个选项。接着可向用户显示这六个选项（第一号选项和五个其它 N 最佳城市），以用于音频或触摸面板输入/选择。因此，如果所有六个选项在集成式输入与显示装置 290 的触摸面板上按次序显示，那么用户可仅触摸且进而选择所述六个选项中的一者。或者，当以音频方式向用户输出第一选项“盐湖城”时，用户可通过发出肯定音频输入来确认对所述以音频方式输出的选项的选择。或者，用户可仅通过说出对应于特定选项的编号（例如，表示第六个选项“斯丹顿”的“6”）来选择其它五个所显示选项中的任一者（或甚至，例如第一个选项）。

通过利用肯定音频输入和/或六个数字值中的仅一者的音频输入，处理器 210 增加证实用户的选择的可能性，且进而可充分地确认用户对特定选项的选择。

其后，一旦用户选择了一城市名称，且此选择在步骤 S12 或 S20 中得到确认，用户就可发出另一音频输出，以供处理器 210 和 ASR 模块输入/接收，所述另一音频输出对应于（例如）街道名称。其后，在城市名称的选择后且在接收到另一音频输出后，处理器 210 和 ASR 模块可确定至少一个街道名称。再一次，处理器 210 和 ASR 模块可确定“N 最佳”街道名称列表，以用于随后以音频和/或视觉方式向导航装置 200 的用户输出，供所述用户随后选择。可以与先前关于城市名称所论述的方式相同的方式来进行选择。

最后，用户可以音频方式输出对应于行进目的地地址的最后一个要素的编号，以供处理器 210 和 ASR 模块输入/接收，所述编号可被辨识，且可用来以与先前关于城市和街道名称所陈述的方式相同的方式确定“N 最佳”列表。或者，用户可仅键入行进目的

地的地址的数字要素（编号）。如此，可输入行进目的地的完整地址，且其后处理器 210 可使用所述地址来确定行进路线（例如，结合指示导航装置 200 的当前位置的 GPS 信号以及存储器 230 中所存储的地图信息）。

应注意，图 5 的过程可开始于对（例如）国家和/或州而非城市名称的音频输入和辨识。另外，在确定了多个国家、州、城市、街道等或其“N 最佳”列表后，所述多个国家、州、城市或街道名称中的每一者可以视觉方式输出，且仅一者以音频方式输出，以供随后通过触摸面板输入或音频输入以与先前描述的方式类似的方式对其进行选择。

如先前所论述，图 6A 提供用于启用音频辨识模式的可选择图标的非限制性实例的说明。应注意，在启用此音频辨识模式后，可改变图标显示，以向用户指示音频辨识模式已被启用，且系统仅正在等待接收音频输入（例如，如图 5 的步骤 4 中所指示）。所述显示可包括以某种方式改变所显示的图标，例如，改变图 6A 中所示的虚拟按钮的颜色，或以其它方式改变此虚拟按钮/图标的外观。这展示于图 6B 中，注意，当等待音频输入时，所述按钮可为不同的颜色，例如绿色。

其后，例如在步骤 S6 中，在系统正确定行进目的地的地址信息选项时，可再次以例如图 6C 中所示方式的方式更改虚拟按钮/图标。最后，在以音频方式输出至少一个已确定选项（图 5 的步骤 S8）后，可再次更改图标，例如，如图 6D 中所示。这可向用户提供关于音频辨识模式的使用的反馈。

应注意，图 5 的步骤 S6 中基于接收到的音频输入对关于行进目的地的地址信息的至少一个选项的确定可涉及以正常方式输入行进目的地的国家/州/城市/街道地址，且/或可涉及基于新近目的地、关注点、偏爱（favorite）等来确定行进目的地，例如，如图 7 中所示。因此，在步骤 S2 中接收到启用音频辨识模式的指示后，可在（例如）导航装置 200 的集成式输入与显示装置 290 上向用户显示例如“您想去何处”的消息。其后，在步骤 S4 中接收到的初始音频输入可为关于信息种类的词的音频输入，例如，“家”710、“偏爱”720、“地址”730、“新近目的地”740 或“关注点（POI）”750。处理器 210 和 ASR 模块可经编程以辨识前述种类 710、720、730、740 或 750 中的一者，使得关于行进目的地的地址信息的所述已确定的至少一个选项可包括传统信息，例如城市、州、街道名称等，或者可包括其它类型的信息，例如关注点、偏爱等。再一次，这些过程中的每一者可确定对关于行进目的地的地址信息的选项的输出，注意，可以音频方式输出最有可能的选项，且通过肯定音频输入（或触摸面板输入）来确认对所述选项的选择，其中以视觉方式输出其它“N 最佳”选项，其中通过音频和视觉输入中的至少一者来确认对所述其它选项的选择。

在一个实例性实施例中，辨识可如下进行：

举例来说，地理名称（城市、街道和十字路口）的辨识过程可根据以下规则来进行：所述过程可由用户起始（例如，选择语音辨识地址条目）。

处理器 210/ASR 模块可接着键入收听模式，且可用（例如）特别图标显示来指示此模式。如果输入的等级在可接受范围内、太低（无输入）、太高，或者如果输入尚未被适当地辨识 （不良输入），那么可改变图标的颜色。此改变可充当对用户的反馈。

如果认为辨识输入可被处理器 210/ASR 模块接受，那么处理器 210/ASR 模块接着可设法使所接受的音素序列与所选择语法的已知序列相匹配。此处，有可能使预编译的语法（已经知道的名称的列表）与语法的动态部分（由用户添加的名称）组合。可能强调此部分，因为其与地图共享（MapShare）技术有关。

经由以 N 最佳列表的形式在集成式输入与显示装置 290 上显示，处理器 210/ASR 模块接着可将结果呈现给用户。举例来说，如果当前语音为 TTS 语音，那么可向用户输出最佳条目（列表中的第一者）。

用户接着可有可能接受或拒绝所述结果。在第一种情况下，处理器 210/ASR 模块进行到下一个步骤，下一个步骤是对下一个地址级（城市->街道、街道->十字路口或街道->门牌号）的辨识或路线的规划。在第二种情况下，如果列表中存在正确的条目，那么用户有可能发出对应于所述条目的行号的音，或者通过说（例如）“返回”而返回到先前步骤。

应注意，已关于本申请的方法而描述了本申请实施例的前述方面中的每一者。然而，本申请的至少一个实施例是针对一种导航装置 200，所述导航装置 200 包括：处理器 210，用以接收对启用导航装置 200 中的音频辨识模式的指示，且用以在接收到音频输入后，基于所述接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以及输出装置 241，用以以音频方式输出关于行进目的地的地址信息的至少一个已确定的选项，所述处理器 210 可进一步用以在接收到肯定音频输入后，确认对所述以音频方式输出的至少一个选项的选择。当输出装置 241 启用对图标和/或选择的显示及其随后的选择时，此导航装置 200 可进一步包括集成式输入与显示装置 290，且/或可进一步包括音频输出装置，例如扬声器。另外，输入装置 220 可包括麦克风。因此，如所属领域的技术人员将理解，此导航装置 200 可用以执行关于图 5 到图 7 而描述的方法的各个方面。因此，为了简洁起见，省略了进一步的阐释。

在本申请的至少一个其它实施例中，一种方法包括：接收对启用导航装置 200 中的音频辨识模式的指示；以及在接收到对启用所述音频辨识模式的指示后，在集成式输入

与显示装置 290 上显示关于接收到的音频输入的音量在可接受范围内、比所述可接受范围高还是比所述可接受范围低的指示。

在本申请的至少一个其它实施例中，一种导航装置 200 包括：处理器 210，用以接收对启用导航装置 200 中的音频辨识模式的指示；以及集成式输入与显示装置 290，用以在处理器 210 接收到对启用所述音频辨识模式的指示后，显示关于接收到的音频输入的音量在可接受范围内、比所述可接受范围高还是比所述可接受范围低的指示。

如先前所指示，本申请的实施例可用以向用户指示音频输入（例如图 5 的步骤 S4 的音频输入）是否在可接受范围内。如图 8 中所示，最初在步骤 S20 中通过处理器 210（例如）结合 ASR 模块来确定音频辨识模式是否被启用。如果被启用，那么视音频输入的音量是否被确定为在可接受范围内而定，可在步骤 S24、S28 和 S32 中显示三个不同的显示。举例来说，在接收到音频输入后，处理器 210 和 ASR 模块可试图查实输入信息。如果音量在可接受范围内，那么处理器 210 和 ASR 模块确定正确输入的可能性较大。

因此，在音频辨识模式被启用后且在接收到音频输入信息后，在步骤 S22 中确定音频输入的音量是否在可接受范围内。可通过处理器 210 将接收到的信息的音量与存储在存储器中的（例如）具有阈值上限和阈值下限的可接受范围进行比较来完成此确定。如果在步骤 S22 中，接收到的音频输入的音量在上阈值与下阈值内，那么处理器接着确定音频输入的音量在可接受范围内。响应于此确定，所述过程移到步骤 S24，在步骤 S24 中，处理器 210 指导对音量在可接受范围内的指示的显示。举例来说，此显示可包括使图 6A 中所示的“与我交谈”图标的颜色改变为例如图 6B 中所示图标的图标，所述图标（例如）为绿色，指示接受。或者，可显示另一指示符，再次注意，可用指示接受的颜色（例如，绿色）来显示所述指示符。

如果在步骤 S22 中确定音量不在可接受范围内，那么处理器 210 接着移到步骤 S26 或步骤 S30，以确定音量比可接受范围高还是比可接受范围低。应注意，步骤 S26 和 S30 的次序并不重要；因为可以任何次序来做出此些确定。如果在步骤 S26 中确定音量比可接受范围高，即大于可接受范围的上阈值，那么在步骤 S28 中可显示一指示，指示音量比可接受范围高。举例来说，可用（例如）红色（指示不正确或某事物过高的颜色）来显示图 6B 的图标，指示音频输入太高，且/或可向用户显示红色指示符，再次指示音量太高。

其后，或在步骤 S26 前，处理器 210 移到步骤 S30，在步骤 S30 中，处理器 210 确定音量是否比可接受范围低。如果音量比可接受范围低，那么在步骤 S32 中可显示一指

示，指示音量比可接受范围低。举例来说，这可涉及用（例如）黄色来显示图 6B 的图标，向用户指示音频输入不够高。或者，可（例如）在集成式输入与显示装置 290 上显示黄色指示符。

应注意，绿色、红色和黄色的使用仅仅是实例，且可利用其它颜色。另外，还可使用显示音量在可接受范围内、比可接受范围高或比可接受范围低的指示的其它方法，包括（但不限于）显示指示用户应小声说话、大声说话等的字词。因此，如图 8 的实例性实施例中所示，本申请的方法可包括接收对启用导航装置 200 中的音频辨识模式的指示，以及在集成式输入与显示装置 290 上且在接收到对启用音频辨识模式的指示后显示关于接收到的音频输入的音量在可接受范围内、比可接受范围高还是比可接受范围低的指示。所述显示可包括（例如）用以显示指示的颜色信息的显示，其中黄色可用以指示接收到的音频输入比可接受范围低，红色可用以指示接收到的音频输入比可接受范围高，且绿色可用以指示接收到的音频输入在可接受范围内。

举例来说，结合图 8 中所示的过程，可接收关于用户的行进目的地的地址信息，其中所述显示可接着指示接收到的信息是否在可接受范围内。因此，地址信息可包括城市名称信息和街道名称信息中的至少一者。另外，在接收到在可接受范围内的地址信息后，所述过程可包括以下动作中的至少一者：辨识所述地址信息、显示无辨识的指示以及在集成式输入与显示装置 290 上向用户显示选项列表以供选择。因此，可集成图 5 中所示的过程与图 8 中所示的过程。

应注意，已关于本申请的方法而描述了本申请实施例的前述方面中的每一者。然而，本申请的至少一个实施例是针对一种导航装置 200，导航装置 200 包括：处理器 210，用以接收对启用导航装置 200 中的音频辨识模式的指示；以及集成式输入与显示装置 290，用以在所述处理器 210 接收到对启用所述音频辨识模式的指示后，显示关于接收到的音频输入的音量在可接受范围内、比所述可接受范围高还是比所述可接受范围低的指示。此导航装置 200 可进一步包括音频输出装置，例如扬声器。另外，输入装置 220 可包括麦克风。因此，如所属领域的技术人员将理解，此导航装置 200 可用以执行关于图 5 到图 8 而描述的方法的各个方面。因此，为了简洁起见，省略了进一步的阐释。

最后，图 9 是针对本申请的另一实施例。通常，当将地址信息键入到导航装置 200 中时，导航装置 200 并不在导航模式下使用。因此，尽管图 5 中所陈述的过程可与导航模式下的导航装置 200 一起使用，但情况通常并非如此，因为在用户刚输入行进目的地（根据所述行进目的地，可确定行进路线）时，（例如）导航装置 200 所在的运输工具通常是静止的。

在本申请的至少一个其它实施例中，一种方法包括：接收对启用导航装置200中的音频辨识模式的指示；从不同于所述导航装置200的用户的来源接收额外信息；基于所述接收到的额外信息，制定可由来自所述用户的是或否回答来回答的问题；以及向所述用户输出所制定的问题。

在本申请的至少一个其它实施例中，一种导航装置200包括：处理器210，用以接收对启用音频辨识模式的指示，用以从不同于所述导航装置200的用户的来源接收额外信息，且用以基于所述接收到的额外信息来制定可由来自所述用户的是或否回答来回答的问题；以及输出装置241，用以向所述用户输出所制定的问题。

本申请的图9包括涉及音频辨识模式的启用的过程，其更有可能可用于在正在移动的运输工具上的导航装置200中，所述导航装置位于所述运输工具中；例如，在导航装置200以导航模式操作的情况下。

在图9中所示的过程中，在步骤S50中，最初确定音频辨识模式是否被启用。举例来说，可以与先前所描述的方式类似的方式来进行此确定，包括（例如）对图6A中所示图标的选择的辨识。一旦此音频辨识模式被启用，导航装置200的处理器210便不仅监视来自用户的音频信息的接收，而且还可监视来自不同于导航装置200的用户的来源的额外信息的接收。因此，在步骤S52中，处理器210确定是否接收到来自不同于用户的来源的额外信息。此信息可包括（但不限于）传入呼叫或消息（例如，由导航装置200本身和/或用成对移动电话接收到的电话呼叫或SMS消息；接收到的交通信息等）的接收。如果未接收到所述额外消息，那么过程仅循环返回且继续监视此信息。

然而，如果在步骤S52中接收到来自不同于导航装置200的用户的来源的额外信息，那么过程移到步骤S54，在步骤S54中，处理器210基于接收到的额外信息来制定可由来自用户的是或否回答来回答的问题。举例来说，处理器210可监视导航装置200中的其它系统（例如，包括成对移动电话），以确定（例如）是否接收到SMS消息。如果接收到SMS消息，那么处理器210可与ASR模块和/或更有可能TTS模块（文本到话音）合作，以制定可由来自用户的是或否回答来回答的问题，所述问题例如是“接收到新的消息；是否应大声将其读出？”。其后，在步骤S56中，可输出所制定的问题，注意，所述输出优选是音频输出（但也可能伴随有（例如）视觉输出）。有些类似的是，当导航装置200可确定接收到指示沿特定时间周期的路线的交通延迟（例如，由处理器210以已知方式计算）的交通更新时，其中处理器210和TTS模块可接着下令输出（例如）“您的路线上的交通延迟现在为“x”分钟。您是否想要重新规划路线以使延迟减到最小？”。

ASR 模块通常用以辨识来自不同用户的话音信息。此信息通常是不可预测的，且因此无法正常地存储于存储器 230 中。如上所述，ASR 模块或引擎结合处理器 210 而操作以便以动态方式将接收到的话音信息转换为音素序列，且与处理器 210 合作以使所存储的城市、街道名称等的现有语法与经转换的音素序列相匹配。如此，ASR 模块动态地致使处理器 210 利用大块存储器 230。

相反，当处理器 210 结合 TTS 模块而工作时，TTS 模块形成（例如）可预定义或预记录于存储器 230 中的问题。TTS 模块可输出任何种类的音频信息，其限制条件为所述音频信息是用语音所对应的语言来表达。被认为是最常使用的短语的一些部分也可由 TTS 模块预记录、存储并稍后使用，以改进输出的质量。因此，虽然 TTS 模块可用以为用户将简单的 SMS 消息转换为语音输出，但 TTS 模块通常最佳结合处理器 210 而工作，以用于在处理器 210 确定例如 SMS 消息、交通更新等额外信息已被导航装置 200 接收到后，输出预制定的问题（如果必要的话，可稍作修改）。此信息可包括交通信息、传入的电话呼叫、传入的 SMS 消息等。

另外，问题的制定可包括基于接收到的信息而将信息插入到所存储的问题中，例如，将交通延迟插入到前述交通延迟问题中。因此，制定可包括基于接收到的交通信息，将关于计算出的交通延迟的信息插入到所存储的问题中。其后，在步骤 S56 中，可输出所制定的问题，注意，所述输出可包括音频输出和视觉输出中的至少一者。

通常制定在步骤 S56 中输出的经制定的问题，以接收来自用户的是或否回答，以进而使处理器 210 能够在行驶状态期间，在导航装置 200 正以导航模式操作时，结合 ASR 模块而操作。在此模式下，导航装置 200 正利用现有存储器 230 的大部分，且优选使 ASR 模块不利用存储器 230 的这么多部分。通过利用是/否问题，处理器 210 和 ASR 模块可容易辨识用户的较短的是或否回答。其后，在接收到来自用户的是回答后，导航装置 200 可执行后续动作，例如基于接收到来自用户的关于计算出的交通延迟的是回答而计算新的行进路线。或者，在额外信息为 SMS 消息时，可通过利用（例如）TTS 模块来转换 SMS 信息，且在接收到来自用户的是回答后，可向用户输出传入的文本消息。

应注意，已关于本申请的方法而描述了本申请实施例的前述方面中的每一者。然而，本申请的至少一个实施例是针对一种导航装置 200，所述导航装置 200 包括：处理器 210，用以接收对启用音频辨识模式的指示，用以从不同于所述导航装置 200 的用户的来源接收额外信息，且用以基于接收到的额外信息来制定可由来自所述用户的是或否回答来回答的问题；以及输出装置 241，用以向所述用户输出所制定的问题。当输出装置 241 启用对图标和/或选择的显示及其随后的选择时，此导航装置 200 可进一步包括集成式输入

与显示装置 290，且/或可进一步包括音频输出装置，例如扬声器。另外，输入装置 220 可包括麦克风。因此，如所属领域的技术人员将理解，此导航装置 200 可用以执行关于图 9 而描述的方法的各个方面。因此，为了简洁起见，省略了进一步的阐释。

上文表达的至少一个实施例的方法可实施为包含于载波或传播信号中的计算机数据信号，所述计算机数据信号表示指令序列，所述指令序列在由处理器（例如服务器 302 的处理器 304 和/或导航装置 200 的处理器 210）执行时致使所述处理器执行相应方法。在至少一个其它实施例中，上文提供的至少一种方法可在上文实施为计算机可读或计算机可存取媒体（例如先前描述的存储器装置中的一者）上所含有的一组指令，以在由处理器或其它计算机装置执行时执行相应方法。在不同的实施例中，媒体可为磁性媒体、电子媒体、光学媒体等。

更进一步地，前述方法中的任一者可体现为程序的形式。程序可存储于计算机可读媒体上且适于当在计算机装置（包括处理器的装置）上运行时执行前述方法中的任一者。因此，存储媒体或计算机可读媒体适于存储信息且适于与数据处理设施或计算机装置交互以执行上文所提及的实施例中的任一者的方法。

存储媒体可为安装于计算机装置主体内部的内建式媒体或经布置成可与计算机装置主体分开的可移除式媒体。内建式媒体的实例包括（但不限于）可重写非易失性存储器（例如 ROM 和快闪存储器）和硬盘。可移除式媒体的实例包括（但不限于）：光学存储媒体，例如 CD-ROM 和 DVD；磁光存储媒体，例如 MO；磁性存储媒体，包括（但不限于）软盘（商标）、盒式磁带和可移除式硬盘；具有内建式可重写非易失性存储器的媒体，包括（但不限于）存储卡；以及具有内建式 ROM 的媒体，包括（但不限于）ROM 盒式磁带；等等。此外，关于所存储图像的各种信息（例如，特性信息）可以任何其它形式进行存储，或其可以其它方式来提供。

如所属领域的技术人员在阅读本揭示内容后将了解，导航装置 200 的电子组件和/或服务器 302 的组件可体现为计算机硬件电路或体现为计算机可读程序，或者体现为所述两者的组合。

本申请的实施例的系统和方法包括在处理器上操作以执行根据本申请的教示的方法中的至少一者的软件。所属领域的技术人员在阅读并理解本发明后将了解可从基于计算机的系统中的计算机可读媒体起动软件程序以执行所述软件程序中所找到的功能的方式。所属领域的技术人员将进一步了解可用于创建经设计以实施并执行本申请的方法中的至少一者的软件程序的各种编程语言。

可使用面向对象的语言（包括但不限于 JAVA、Smalltalk、C++等）以面向对象的方

式构造所述程序，且可使用程序语言（包括但不限于 COBAL、C 等）以面向程序的方式构造所述程序。软件组件可以所属领域的技术人员众所周知的任何数目种方式进行通信，其包括（但不限于）通过应用程序接口（API）、进程间通信技术（包括但不限于报告程序调用（RPC）、公用对象请求代理程序结构（CORBA）、组件对象模型（COM）、分布式组件对象模型（DCOM）、分布式系统对象模型（DSOM）和远程方法调用（RMI））。然而，如所属领域的技术人员在阅读本申请揭示内容后将了解，本申请的教示不限于特定编程语言或环境。

已相对于为导航装置 200 改进准确度、处理器速度和用户交互简易性等来以实例方式而非以限制方式描述了以上系统、装置和方法。

另外，在本揭示内容和所附权利要求书的范围内，不同实例性实施例的元件和/或特征可彼此组合且/或彼此替代。

更进一步地，可以设备、方法、系统、计算机程序和计算机程序产品的形式来体现本发明的上述和其它实例性特征中的任一者。举例来说，可以系统或装置的形式体现前述方法，其包括（但不限于）用于执行图式中所说明的方法的任何结构。

已如此描述了实例性实施例，将显而易见的是可以许多方式使其变化。不应将所述变化视为脱离本发明的精神和范围，且所属领域的技术人员将显而易见的所有所述修改均希望包括于所附权利要求书的范围内。

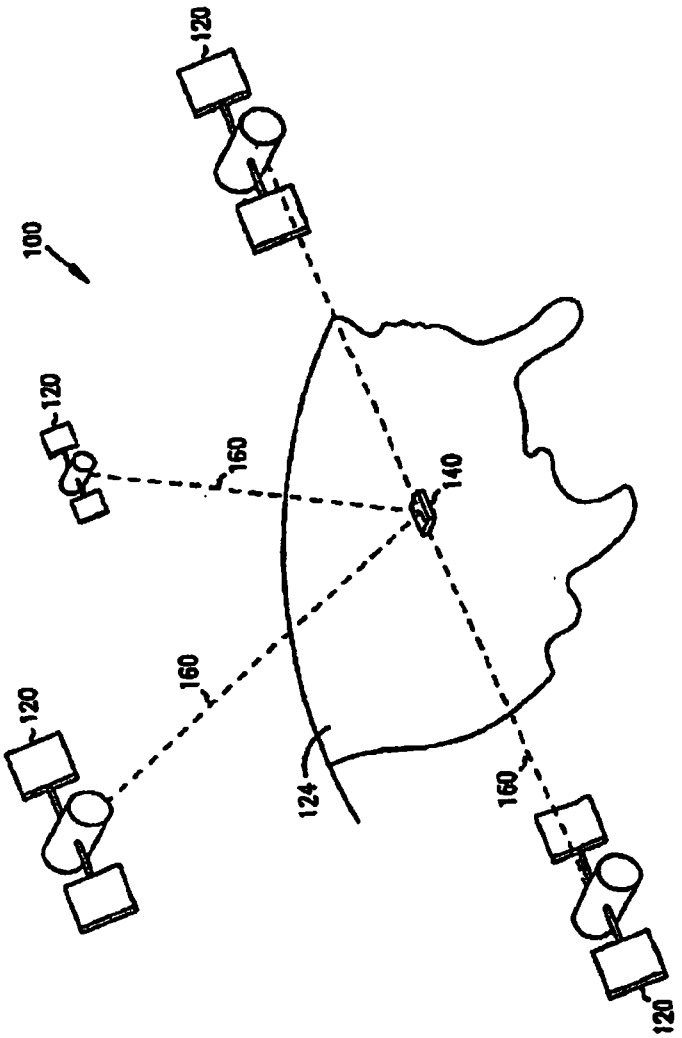



图1

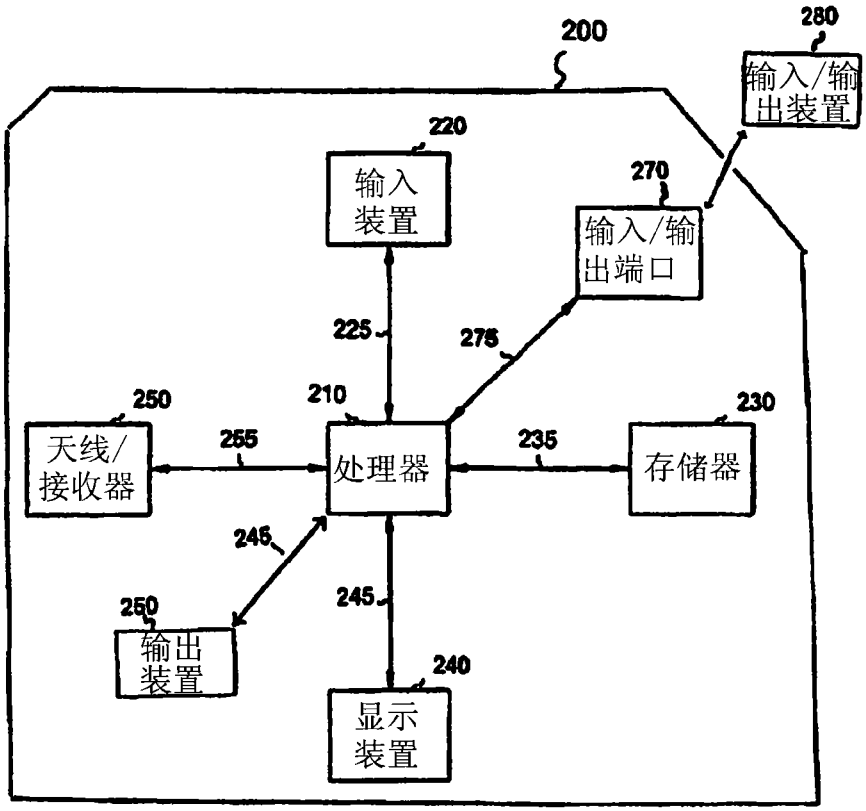

200
280
输入/输出装置
220
输入装置
270
输入/输出端口
225
275
250
210
230
天线/接收器
255
处理器
235
存储器
245
250
245
输出装置
240
显示装置

图2

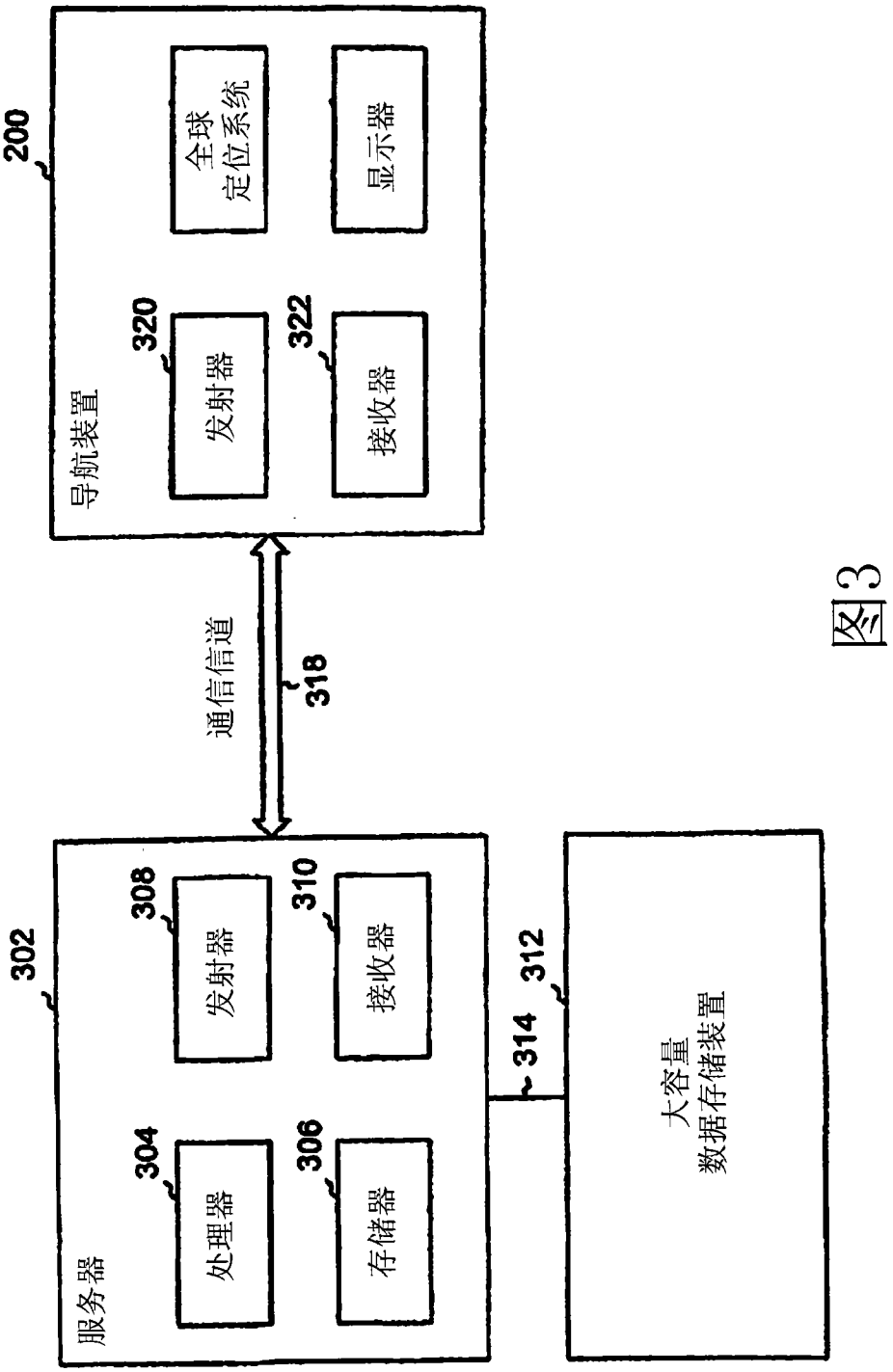

200
导航装置
全球定位系统
显示器
320
发射器
322
接收器
通信信道
318
302
服务器
308
发射器
310
接收器
304
处理器
306
存储器
314
312
大容量
数据存储装置

图3

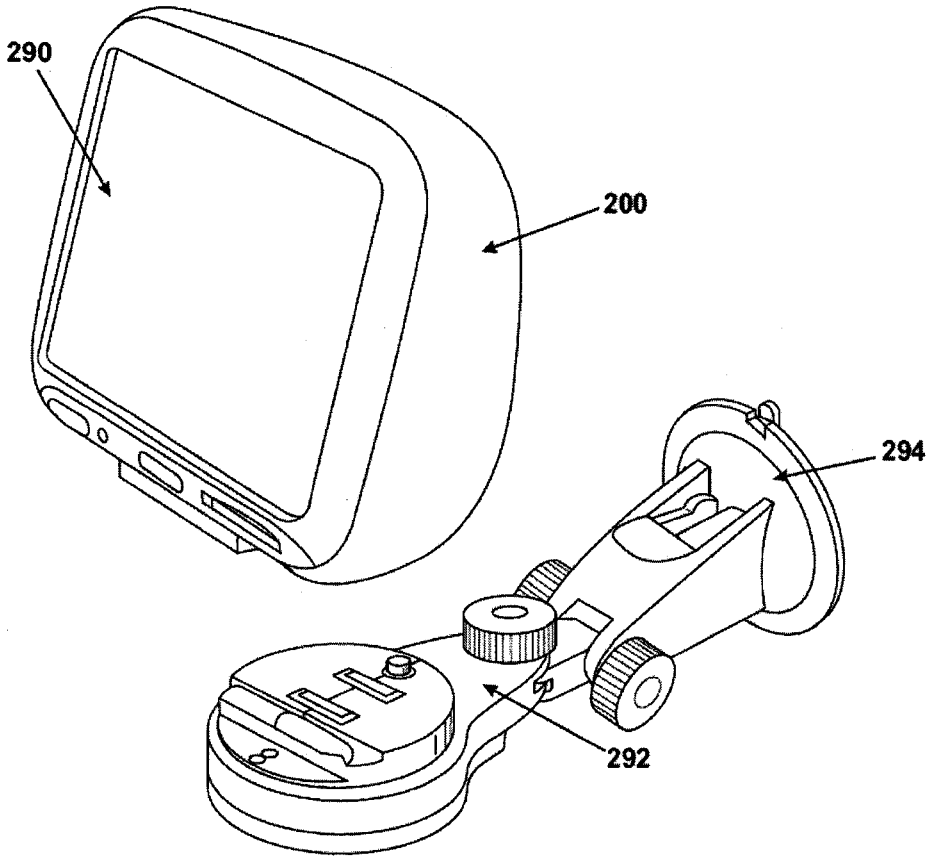



图 4A

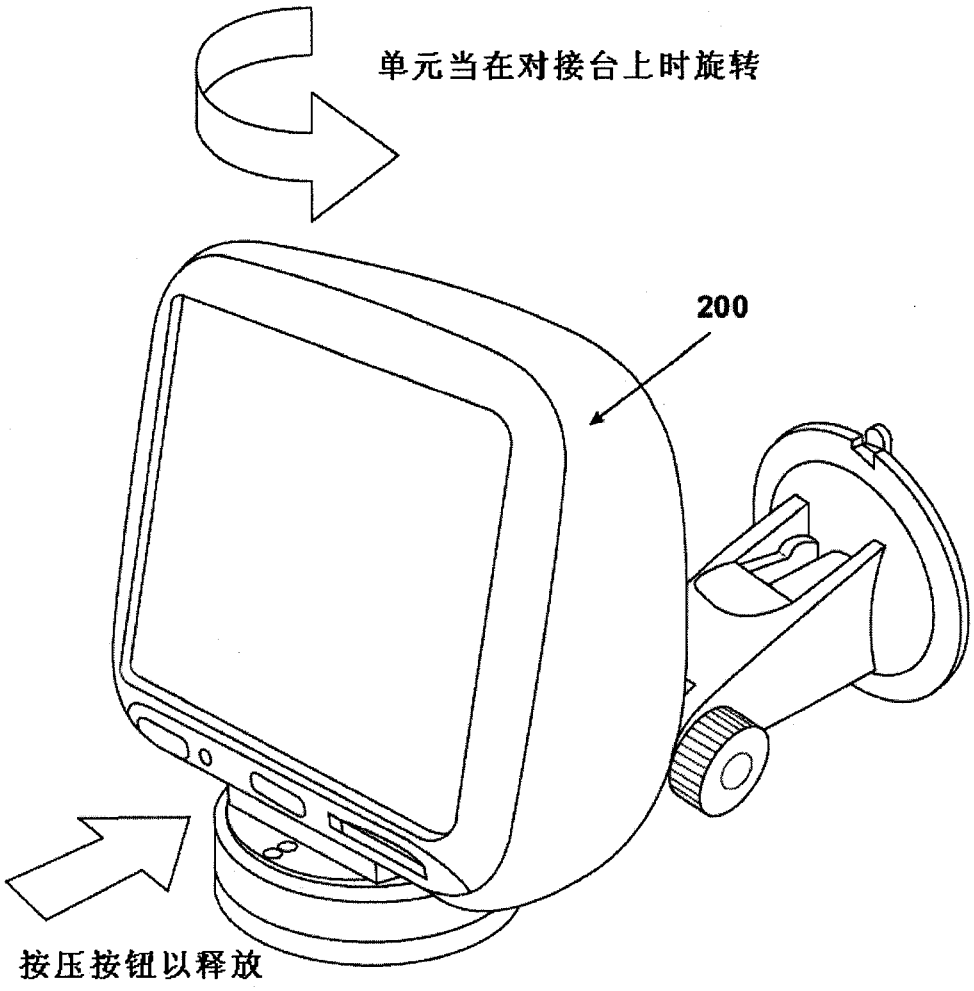



图 4B

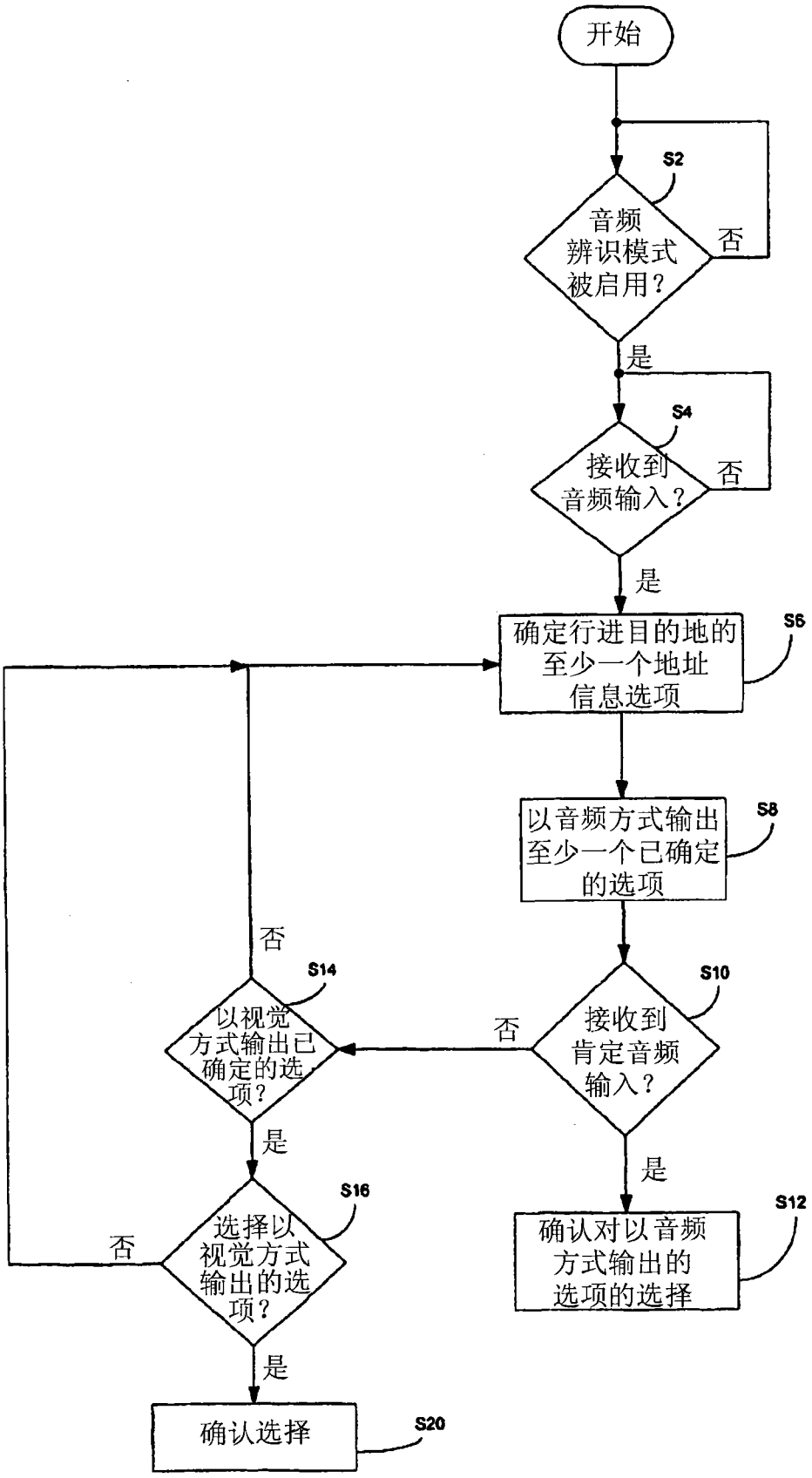

开始
S2
音频辨识模式被启用？
否
是
S4
接收到音频输入？
否
是
确定行进目的地的至少一个地址信息选项
S6
以音频方式输出至少一个已确定的选项
S8
S10
接收到肯定音频输入？
否
是
S12
确认对以音频方式输出的选项的选择
S14
以视觉方式输出已确定的选项？
否
是
S16
选择以视觉方式输出的选项？
否
是
确认选择
S20

图5

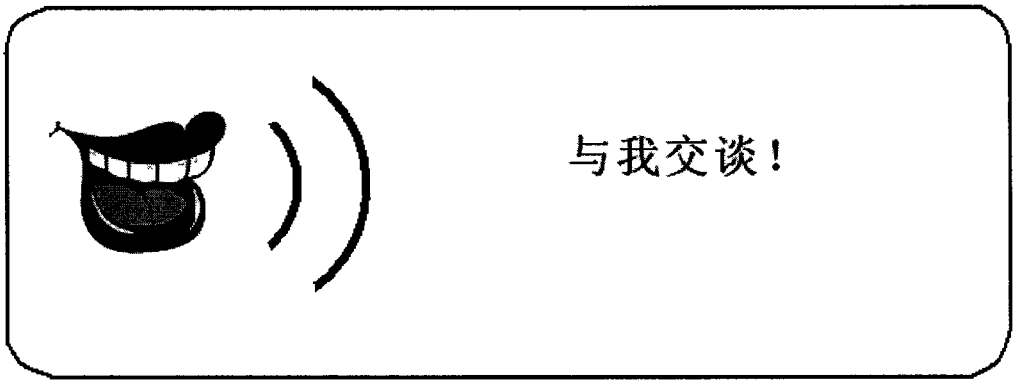



图 6A

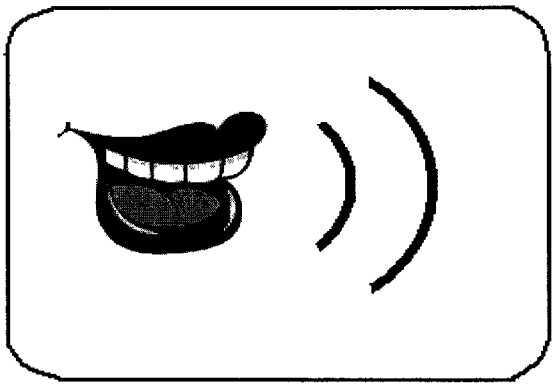


图 6B

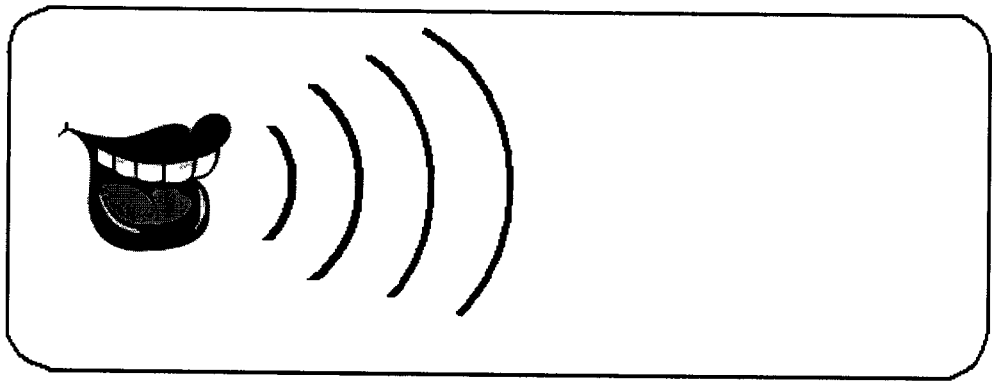


图 6C

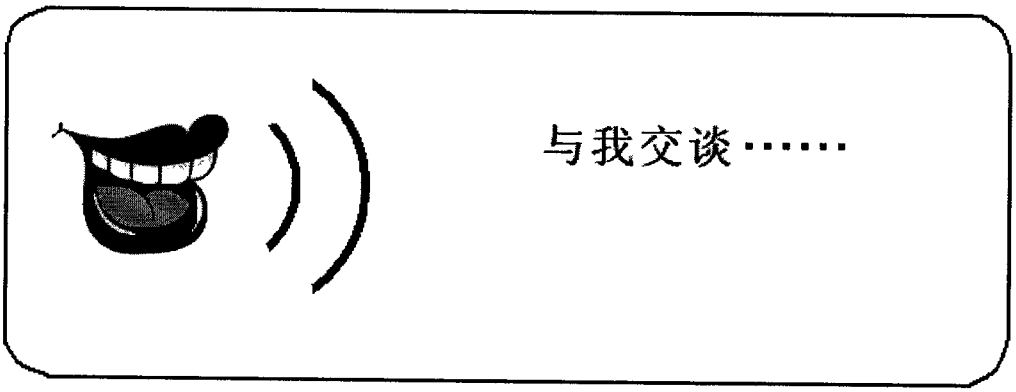



图 6D

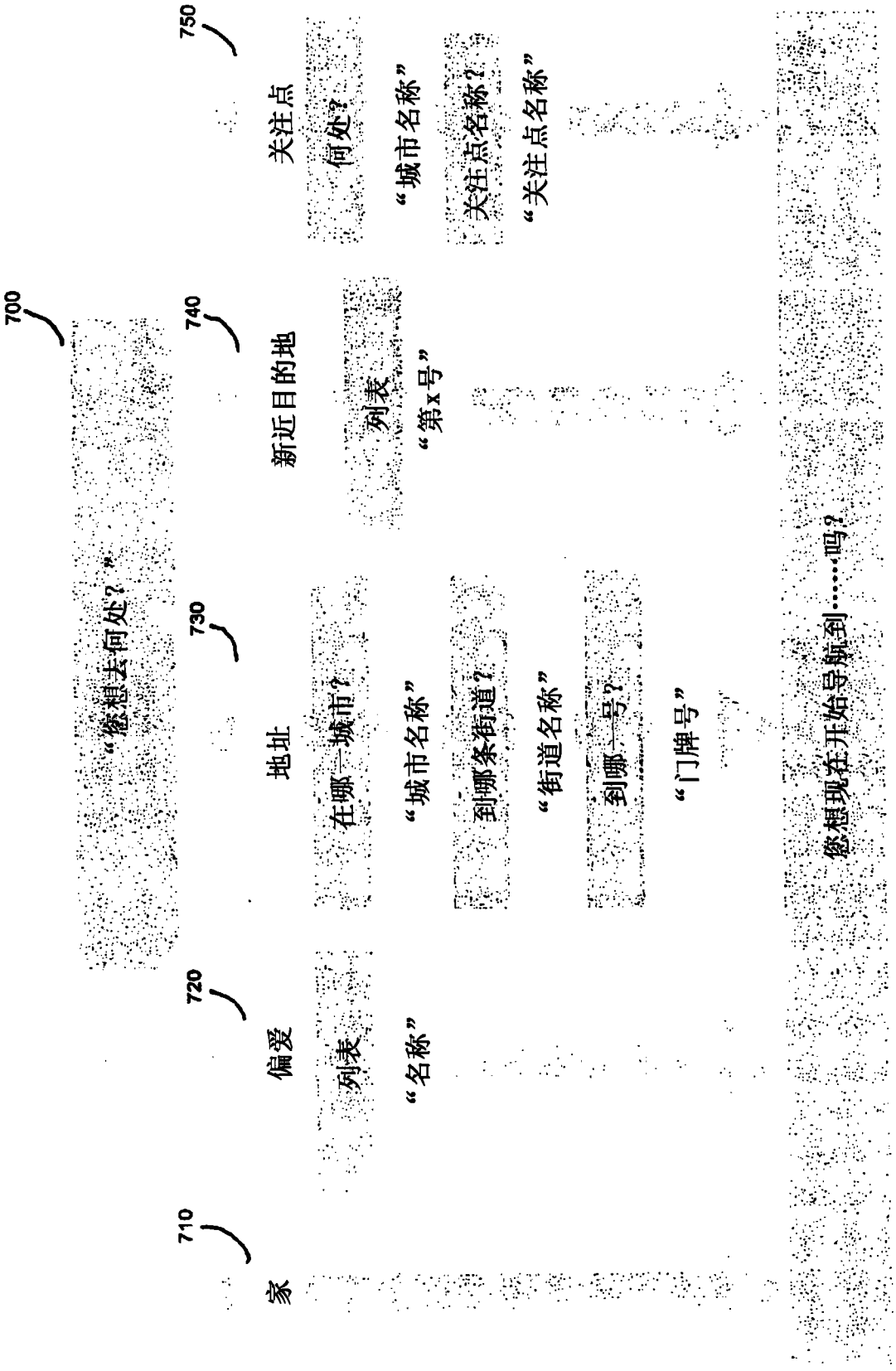

700
710
家
720
偏爱
列表
“名称”
730
地址
在哪一城市?
“城市名称”
到哪条街道?
“街道名称”
到哪一号?
“门牌号”
740
新近目的地
列表
“第x号”
750
关注点
何处?
“城市名称”
关注点名称?
“关注点名称”
“您想去何处?”
您想现在开始导航到……吗?

图7

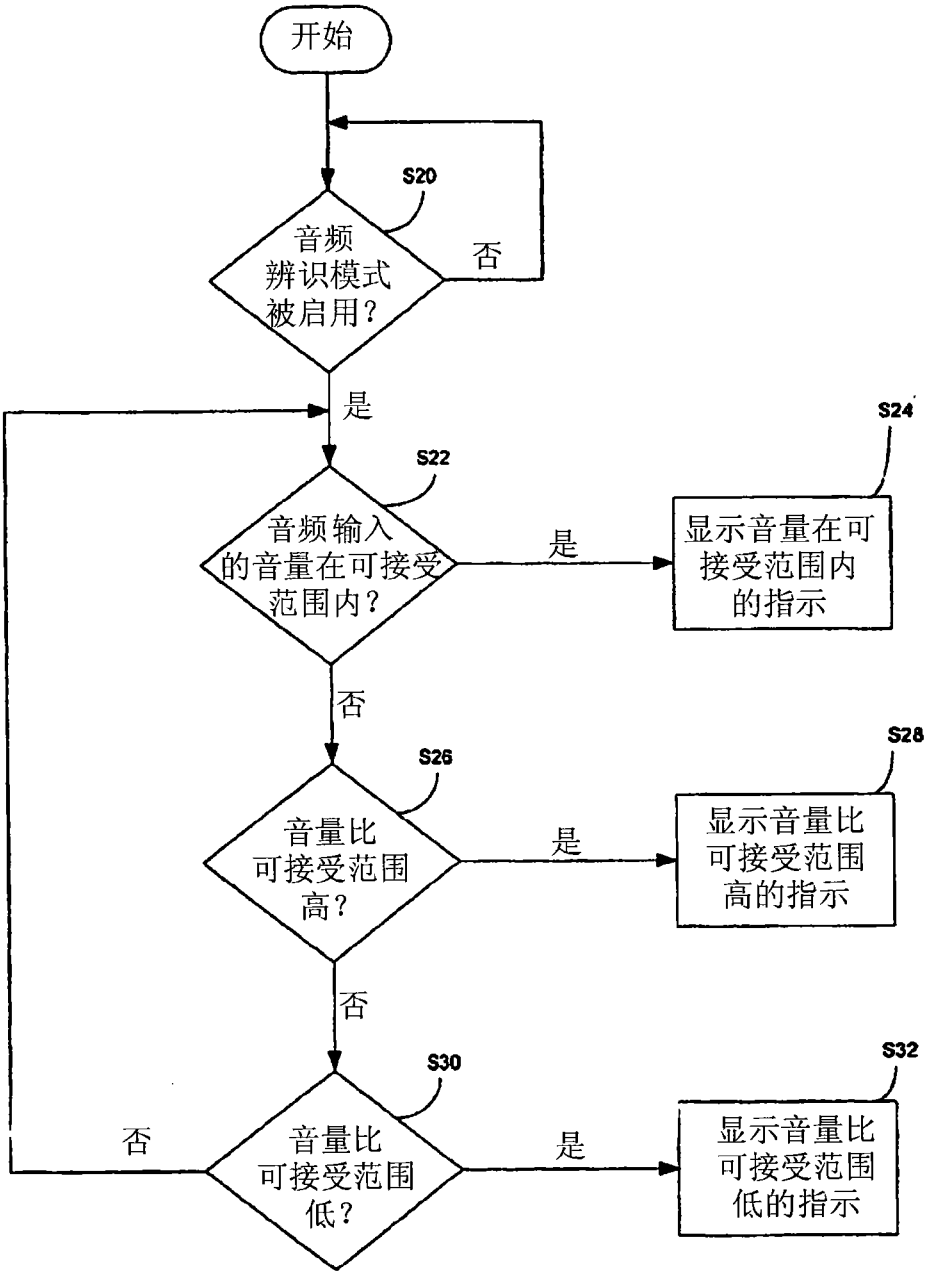

开始
S20
音频辨识模式被启用？
否
是
S22
音频输入的音量在可接受范围内？
是
S24
显示音量在可接受范围内的指示
否
S26
音量比可接受范围高？
是
S28
显示音量比可接受范围高的指示
否
S30
音量比可接受范围低？
否
是
S32
显示音量比可接受范围低的指示

图8

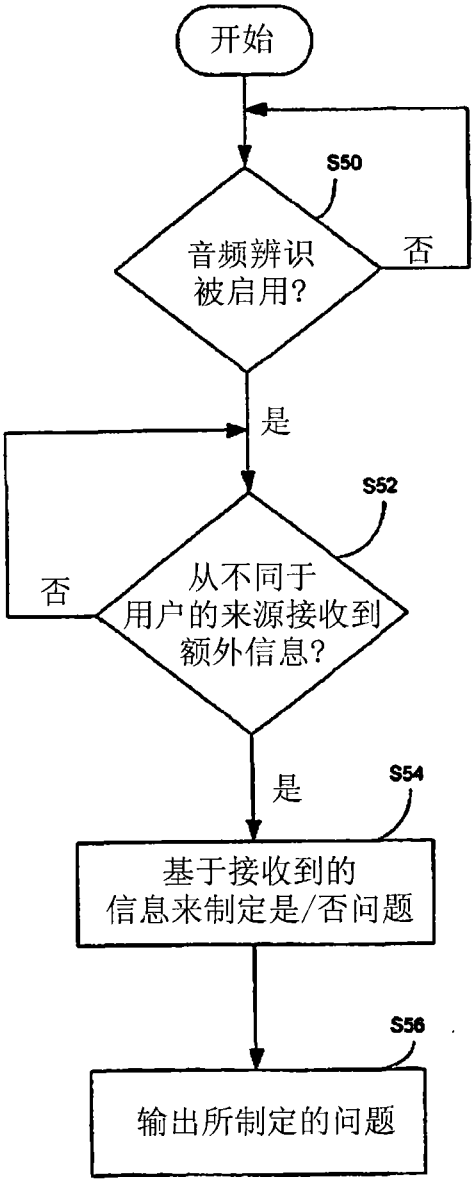

开始
S50
音频辨识
被启用?
否
是
S52
从不同于
用户的来源接收到
额外信息?
否
是
S54
基于接收到的
信息来制定是/否问题
S56
输出所制定的问题

图9

# A NAVIGATION DEVICE, A METHOD OF AND A COMPUTER PROGRAM FOR OPERATING THE NAVIGATION DEVICE COMPRISING AN AUDIBLE RECOGNITION MODE


## Abstract

A method of operating a navigation device. includes receiving an indication of enablement of an audible recognition mode in the navigation device; determining at least one choice relating to address information of a travel destination based upon the received audible input; audibly outputting the at least one determined choice; and acknowledging selection of the audibly output upon receiving an affirmative audible input. The navigation device includes a processor, memory, a microphone, user input means and a visual display to receive an indication of enablement of an audible recognition mode and to determine at least one choice relating to address information of a travel destination based upon the received audible input; and an output device to audibly output the at least one determined choice, the processor being further useable to acknowledge selection of the audibly output of the at least one determined choice upon receiving an affirmative audible input.

# 导航装置、操作包含音频辨识模式的所述导航装置的方法和计算机程序

## 摘要

一种操作导航装置的方法，其包括：接收对启用所述导航装置中的音频辨识模式的指示；基于接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以音频方式输出所述至少一个已确定的选项；以及在接收到肯定音频输入后，确认对所述音频方式输出的选择。所述导航装置包括处理器、存储器、麦克风、用户输入构件和视觉显示器，用以接收对启用音频辨识模式的指示且用以基于接收到的音频输入来确定关于行进目的地的地址信息的至少一个选项；以及输出装置，用以以音频方式输出所述至少一个已确定的选项，所述处理器进一步可用以在接收到肯定音频输入后，确认对所述至少一个已确定选项的所述音频方式输出的选择。