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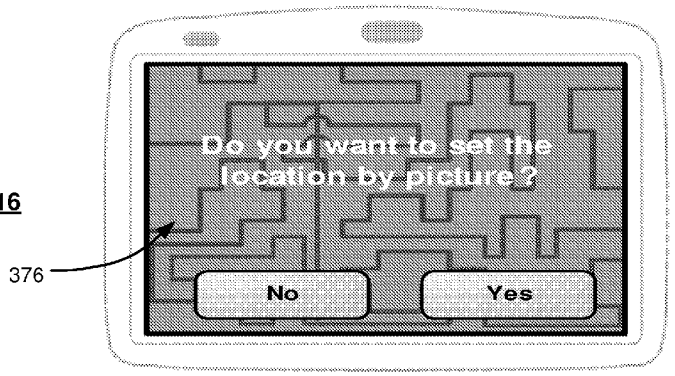


Figure 16

(57) Abstract: A navigation apparatus (170) comprises a processing resource (202) arranged to support, when in use, an operational environment (262). The operational environment (262) supports a user interface and an object retriever (266). The object retriever (266) is arranged to generate a location-related criterion and to send a request to retrieve object data associated with the location-related criterion. The object retriever (266) is also arranged to receive responsive to the request the object data and location identifying data associated therewith. The user interface is arranged to permit review of an object associated with the object data and to permit selection of the location identifying data associated with the object.

NAVIGATION APPARATUS, LOCATION SELECTION SUPPORT SYSTEM AND METHOD OF SUPPORTING LOCATION SELECTION

Field of the Invention

The present invention relates to a navigation apparatus of the type that, for example, provides access to location data in relation to a navigation-related function. The present invention also relates to a location selection support system of the type that, for example, provides accesses to location data in relation to a navigation-related function. The present invention also relates to a method of supporting location selection, the method being of the type that, for example, provides access to location data in relation to a navigation-related function.

Background to the Invention

Portable computing devices, for example Portable Navigation Devices (PNDs) that include GPS (Global Positioning System) signal reception and processing functionality are well known and are widely employed as in-car or other vehicle navigation systems.

In general terms, a modern PND comprises a processor, memory and map data stored within said memory. The processor and memory cooperate to provide an execution environment in which a software operating system is typically established, and additionally it is commonplace for one or more additional software programs to be provided to enable the functionality of the PND to be controlled, and to provide various other functions.

Typically, these devices further comprise one or more input interfaces that allow a user to interact with and control the device, and one or more output interfaces by means of which information may be relayed to the user. Illustrative examples of output interfaces include a visual display and a speaker for audible output. Illustrative examples of input interfaces include one or more physical buttons to control on/off operation or other features of the device (which buttons need not necessarily be on the device itself but can be on a steering wheel if the device is built into a vehicle), and a microphone for detecting user speech. In one particular arrangement, the output interface display may be configured as a touch sensitive display (by means of a touch sensitive overlay or otherwise) additionally to provide an input interface by means of which a user can operate the device by touch.

Devices of this type will also often include one or more physical connector interfaces by means of which power and optionally data signals can be transmitted to

and received from the device, and optionally one or more wireless transmitters/receivers to allow communication over cellular telecommunications and other signal and data networks, for example Bluetooth, Wi-Fi, Wi-Max, GSM, UMTS and the like.

PNDs of this type also include a GPS antenna by means of which satellite-broadcast signals, including location data, can be received and subsequently processed to determine a current location of the device.

The PND may also include electronic gyroscopes and accelerometers which produce signals that can be processed to determine the current angular and linear acceleration, and in turn, and in conjunction with location information derived from the GPS signal, velocity and relative displacement of the device and thus the vehicle in which it is mounted. Typically, such features are most commonly provided in in-vehicle navigation systems, but may also be provided in PNDs if it is expedient to do so.

The utility of such PNDs is manifested primarily in their ability to determine a route between a first location (typically a start or current location) and a second location (typically a destination). These locations can be input by a user of the device, by any of a wide variety of different methods, for example by postcode, street name and house number, previously stored “well known” destinations (such as famous locations, municipal locations (such as sports grounds or swimming baths) or other points of interest), and favourite or recently visited destinations.

Typically, the PND is enabled by software for computing a "best" or "optimum" route between the start and destination address locations from the map data. A "best" or "optimum" route is determined on the basis of predetermined criteria and need not necessarily be the fastest or shortest route. The selection of the route along which to guide the driver can be very sophisticated, and the selected route may take into account existing, predicted and dynamically and/or wirelessly received traffic and road information, historical information about road speeds, and the driver's own preferences for the factors determining road choice (for example the driver may specify that the route should not include motorways or toll roads).

The device may continually monitor road and traffic conditions, and offer to or choose to change the route over which the remainder of the journey is to be made due to changed conditions. Real time traffic monitoring systems, based on various technologies (e.g. mobile phone data exchanges, fixed cameras, GPS fleet tracking), are being used to identify traffic delays and to feed the information into notification systems.

PNDs of this type may typically be mounted on the dashboard or windscreen of a vehicle, but may also be formed as part of an on-board computer of the vehicle radio or indeed as part of the control system of the vehicle itself. The navigation device may also

be part of a hand-held system, such as a PDA (Portable Digital Assistant), a media player, a mobile telephone or the like, and in these cases, the normal functionality of the hand-held system is extended by means of the installation of software on the device to perform both route calculation and navigation along a calculated route.

Route planning and navigation functionality may also be provided by a desktop or mobile computing resource running appropriate software. For example, the Royal Automobile Club (RAC) provides an on-line route planning and navigation facility at http://www.rac.co.uk, which facility allows a user to enter a start point and a destination whereupon the server with which the user's computing resource is communicating calculates a route (aspects of which may be user specified), generates a map, and generates a set of exhaustive navigation instructions for guiding the user from the selected start point to the selected destination. The facility also provides for pseudo three-dimensional rendering of a calculated route, and route preview functionality which simulates a user travelling along the route and thereby provides the user with a preview of the calculated route.

In the context of a PND, once a route has been calculated, the user interacts with the navigation device to select the desired calculated route, optionally from a list of proposed routes. Optionally, the user may intervene in, or guide the route selection process, for example by specifying that certain routes, roads, locations or criteria are to be avoided or are mandatory for a particular journey. The route calculation aspect of the PND forms one primary function, and navigation along such a route is another primary function.

During navigation along a calculated route, it is usual for such PNDs to provide visual and/or audible instructions to guide the user along a chosen route to the end of that route, i.e. the desired destination. It is also usual for PNDs to display map information on-screen during the navigation, such information regularly being updated on-screen so that the map information displayed is representative of the current location of the device, and thus of the user or user's vehicle if the device is being used for in-vehicle navigation.

An icon displayed on-screen typically denotes the current device location, and is centred with the map information of current and surrounding roads in the vicinity of the current device location and other map features also being displayed. Additionally, navigation information may be displayed, optionally in a status bar above, below or to one side of the displayed map information, examples of navigation information include a distance to the next deviation from the current road required to be taken by the user, the nature of that deviation possibly being represented by a further icon suggestive of the

particular type of deviation, for example a left or right turn. The navigation function also determines the content, duration and timing of audible instructions by means of which the user can be guided along the route. As can be appreciated, a simple instruction such as "turn left in 100 m" requires significant processing and analysis. As previously mentioned, user interaction with the device may be by a touch screen, or additionally or alternately by steering column mounted remote control, by voice activation or by any other suitable method.

A further important function provided by the device is automatic route re-calculation in the event that: a user deviates from the previously calculated route during navigation (either by accident or intentionally); real-time traffic conditions dictate that an alternative route would be more expedient and the device is suitably enabled to recognize such conditions automatically, or if a user actively causes the device to perform route re-calculation for any reason.

As mentioned above, it is also known to allow a route to be calculated with user defined criteria; for example, the user may prefer a scenic route to be calculated by the device, or may wish to avoid any roads on which traffic congestion is likely, expected or currently prevailing. The device software would then calculate various routes and weigh more favourably those that include along their route the highest number of points of interest (known as POIs) tagged as being for example of scenic beauty, or, using stored information indicative of prevailing traffic conditions on particular roads, order the calculated routes in terms of a level of likely congestion or delay on account thereof. Other POI-based and traffic information-based route calculation and navigation criteria are also possible.

Although the route calculation and navigation functions are fundamental to the overall utility of PNDs, it is possible to use the device purely for information display, or "free-driving", in which only map information relevant to the current device location is displayed, and in which no route has been calculated and no navigation is currently being performed by the device. Such a mode of operation is often applicable when the user already knows the route along which it is desired to travel and does not require navigation assistance.

Devices of the type described above, for example the GO 930 Traffic model manufactured and supplied by TomTom International B.V., provide a reliable means for enabling users to navigate from one position to another. Such devices are of great utility when the user is not familiar with the route to the destination to which they are navigating.

As indicated above, the user selects a location, for example a destination

location, using textual information. Textual information is provided to the navigation apparatus and textual feedback is received by the user from the navigation apparatus during provision of the textual information to set the location. Furthermore, selection of the location information is based upon address information obtained from different sources, such as a contacts database, a web page or printed material, but nevertheless textual in nature. Alternatively, a points of interest data set can be searched in order to select a desired location. In both examples, and as mentioned above, the location is selected based upon textual information. The use of textual information alone as a basis for selection of the location requires multiple key presses or like gestures from the user and is sometimes time-consuming. Additionally, selection on a purely textual basis is of limited scope with respect to communication of information between the user and the navigation apparatus and deprives the user of sometimes useful information upon which to base a selection decision.

Summary of the Invention

According to a first aspect of the present invention, there is provided a navigation apparatus comprising: a processing resource arranged to support, when in use, an operational environment, the operational environment supporting a user interface; an object retriever supported by the operational environment, the object retriever being arranged to generate a location-related criterion and to send a request to retrieve object data associated with the location-related criterion; wherein the object retriever is arranged to receive responsive to the request the object data and location identifying data associated therewith; and the user interface is arranged to permit review of an object associated with the object data and to permit selection of the location identifying data associated with the object.

The object retriever may generate the location-related criterion based upon user-specified location information. The user-specified location information may be converted into location coordinates. The location-related criterion may be generated so as to include the location coordinates.

The object data may comprise a reference to the object.

The location-related criterion may identify a geographical area. The geographical area is substantially rectangular.

The apparatus may further comprise a navigation-related function supported by the operational environment; wherein the user interface may be arranged to support selection of the location identifying data in relation to the navigation-related function.

The navigation-related function may be setting of a “favourites” location.

The navigation-related function may comprise route calculation. The navigation-related function may further comprise identification of the object along a calculated route.

The identification of the object along the calculated route may be within a buffer area. The buffer area may be defined by the location-related criterion.

The navigation-related function may be selection of a destination location for the route calculation.

The navigation-related function may be generation of an item of an itinerary.

The navigation-related function may be modification of an itinerary.

The navigation-related function may further comprise identification of the object along a route following the itinerary.

The identification of the object along the route following the itinerary may be within a buffer area. The buffer area may be defined by the location-related criterion.

The object may be an image. The object retriever may be an image data retriever.

The object may be audio data.

The user interface may be arranged to show the object as a thumbnail image or represent the object as an icon.

The route may comprise a number of route segments; and the object retriever may be arranged to define a number of geographical areas and to send a number of requests respectively in respect of the number of geographical areas.

The object retriever may be arranged to receive responsive to the number of requests at least one object data and respective at least one location identifying data associated therewith.

The object retriever may be arranged to receive responsive to the request additional data associated with the object. The additional data may relate to an attribute of the object data.

The object retriever may be arranged to receive responsive to the request a number of object data and respective location identifying data associated therewith; and the object retriever may be further arranged to receive a filter criterion via the user interface and to filter the number of object data using the respective additional data associated therewith and the filter criterion.

The object retriever may be arranged to receive via the user interface a filter criterion in addition to the location-related criterion and to include the filter criterion in the request sent in order to retrieve the object data associated with the location-related criterion provided an attribute associated with the object data conforms to the filter criterion.

The request to retrieve the object data may be a search request.

According to a second aspect of the present invention, there is provided a portable navigation device comprising the navigation apparatus as set forth above in relation to the first aspect of the invention.

According to a third aspect of the present invention, there is provided a device management apparatus for coupling to a navigation apparatus, the apparatus comprising the navigation apparatus as set forth above in relation to the first aspect of the invention.

According to a fourth aspect of the present invention, there is provided a location selection support system, the system comprising: a navigation apparatus as set forth above in relation to the first aspect of the invention; and a server apparatus having access to the object data and associated location data, the server apparatus being arranged to mine the object data and associated location data in response to the request to retrieve the object data.

According to a fifth aspect of the present invention, there is provided a method of supporting location selection, the method comprising: generating a location-related criterion; sending a request to retrieve object data associated with the location-related criterion; receiving responsive to the request the object data and location identifying data associated therewith; permitting review of an object associated with the object data; and permitting selection of the location identifying data associated with the object.

According to a sixth aspect of the present invention, there is provided a computer program element comprising computer program code means to make a computer execute the method as set forth above in relation to the fifth aspect of the invention.

The computer program element may be embodied on a computer readable medium.

Advantages of these embodiments are set out hereafter, and further details and features of each of these embodiments are defined in the accompanying dependent claims and elsewhere in the following detailed description.

It is thus possible to provide an apparatus, system and method that enable a user to select a location in connection with a navigation-related function without provision of textual information precisely identifying the location selected. The use of, for example, graphical selection of the location enhances destination selection functionality, thereby providing an improved user experience in relation to location selection, as well as the possibility of saving the user time and reducing inconvenience to the user. Furthermore, the apparatus, system and method reduce the amount of key-presses required from a user to select the location and so reduces workload for a driver, thereby

improving driver safety.

Brief Description of the Drawings

At least one embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic illustration of an exemplary part of a Global Positioning System (GPS) usable by a navigation apparatus;

Figure 2 is a schematic diagram of a location selection support system supporting communication between a navigation apparatus and a server apparatus;

Figure 3 is a schematic illustration of electronic components of the navigation apparatus of Figure 2 or any other suitable navigation apparatus;

Figure 4 is a schematic representation of an architectural stack employed by the navigation apparatus of Figure 3;

Figure 5 is a flow diagram of a method of supporting location selection constituting an embodiment of the invention;

Figure 6 and 7 are screen shots from a device management application during performance of the method of Figure 5;

Figure 8 is a flow diagram of another method of supporting location selection constituting another embodiment of the invention;

Figures 9 to 19 are schematic screen shots associated with operation of the navigation apparatus of Figure 3 during the method of Figure 8;

Figure 20 is a flow diagram of a further method of supporting location selection constituting a further embodiment of the invention;

Figure 21 is a schematic screen shot associated with operation of the navigation apparatus of Figure 3 during the method of Figure 20;

Figure 22 is a flow diagram of a yet another method of supporting location selection constituting yet another embodiment of the invention; and

Figures 23 and 24 are schematic screen shots associated with operation of the navigation apparatus of Figure 3 during the method of Figure 22.

Detailed Description of Preferred Embodiments

Throughout the following description identical reference numerals will be used to identify like parts.

One or more embodiments of the present invention will now be described with particular reference to a PND or a device management application for the PND. It should be remembered, however, that the teachings herein are not limited to PNDs but

are instead universally applicable to any type of processing device, for example but not essentially those configured to execute navigation software in a portable and/or mobile manner so as to provide route planning and navigation functionality. It follows therefore that in the context of the embodiments set forth herein, a navigation apparatus is intended to include (without limitation) any type of route planning and navigation apparatus, irrespective of whether that device is embodied as a PND, a vehicle such as an automobile, or indeed a portable computing resource, for example a portable personal computer (PC), a mobile telephone or a Personal Digital Assistant (PDA) executing, for example, route planning and navigation software. Indeed, a mobile telephone, smartphone or the like can simply be employed in respect of some embodiments without the benefit of route planning or navigation software.

With the above provisos in mind, the Global Positioning System (GPS) of Figure 1 and the like are used for a variety of purposes. In general, the 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 orbit 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 allows 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 100 comprises a plurality of satellites 102 orbiting about the earth 104. A GPS receiver 106 receives spread spectrum GPS satellite data signals 108 from a number of the plurality of satellites 102. The spread spectrum data signals 108 are continuously transmitted from each satellite 102, the spread spectrum data signals 108 transmitted each comprise a data stream including

information identifying a particular satellite 102 from which the data stream originates. The GPS receiver 106 generally requires spread spectrum data signals 108 from at least three satellites 102 in order to be able to calculate a two-dimensional position. Receipt of a fourth spread spectrum data signal enables the GPS receiver 106 to calculate, using a known technique, a three-dimensional position.

Referring to Figure 2, a location selection support system comprises a client terminal 170 in communication with a server 150 via a generic communications channel 152 that can be implemented by any of a number of different arrangements. The communication channel 152 generically represents the propagating medium or path that connects the client terminal 170 and the server 150. The server 150 and the client terminal 170 can communicate when a connection via the communications channel 152 is established between the server 150 and the client terminal 170 (noting that such a connection can be a data connection via mobile device, a direct connection via the Internet, etc.).

The communication channel 152 is not limited to a particular communication technology. Additionally, the communication channel 152 is not limited to a single communication technology; that is, the channel 152 may include several communication links that use a variety of technologies. For example, the communication channel 152 can provide a path for electrical, optical, and/or other electromagnetic communications, etc. As such, the communication channel 152 includes, but is not limited to, one or a combination of the following: electric circuits, electrical conductors such as wires and coaxial cables, fibre optic cables, converters, radio-frequency (RF) waves, the atmosphere, free space, etc. Additionally, the communication channel 152 can accommodate satellite communication if required. Furthermore, the communication channel 152 can include intermediate devices such as routers, repeaters, buffers, transmitters, and receivers, for example. In one illustrative arrangement, the communication channel 152 is supported by telephone and computer networks.

The communication signals transmitted through the communication channel 152 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 152. These signals can be modulated, encrypted and/or compressed signals as may be desirable for the communication technology.

The server 150 includes, in addition to other components which may not be illustrated, a processor 154 operatively connected to a memory 156 and further operatively connected, via a wired or wireless connection 158, to a mass data storage device 160. In this example, the mass storage device 160 contains a store of search-related data including objects, for example images and/or audio data, and location information associated with each object. For example, the images are digital photographs at the respective locations. The objects and location information can be arranged in a database. The processor 154 is further operatively connected to transmitter 162 and receiver 164, to transmit and receive information to and from the client terminal 170 via the communications channel 152. The signals sent and received may include data, communication, and/or other propagated signals. The transmitter 162 and receiver 164 may be selected or designed according to the communications requirement and communication technology used in the communication design for the client terminal 170. Further, it should be noted that the functions of the transmitter 162 and the receiver 164 may be combined into a single transceiver.

Software stored in server memory 156 provides instructions for the processor 154 and allows the server 150 to provide services, in this example an image search service, to the client terminal 170.

As mentioned above, the client terminal 170 can be arranged to communicate with the server 150 through communications channel 152, using transmitter 166 and receiver 168 of the client terminal 170 to send and receive signals and/or data through the communications channel 152, noting that the transmitter 166 and the receiver 168 can further be used to communicate with devices other than server 150. Further, the transmitter 166 and the receiver 168 are selected or designed according to communication requirements and communication technology used in the communication design for the client terminal 170 and the functions of the transmitter 166 and receiver 168 may be combined into a single transceiver.

In this embodiment, the navigation apparatus 200 is connectable to the client terminal 170 via a cable and an input/output port 172 of the client terminal 170, for example a Universal Serial Bus (USB) port. The client terminal 170 is, in this example, a PC, for example a desktop or laptop, supporting an operating system, such as a version of the Windows™ operating system distributed by Microsoft Corporation. However, the skilled person should appreciate that any other suitable operating system can be employed, for example OS X available from Apple, Inc. As PCs are commonplace, the hardware configuration of the PC 170 will not be described in further detail herein for the sake of conciseness and clarity of description. However, the skilled person will

appreciate that the PC comprises a processing resource 169 for supporting, in some embodiments, a device management application 171. The PC also comprises peripherals, for example input and/or output devices, such as a keyboard (not shown), a display (not shown) and optionally a mouse (also not shown).

In this example, the server 150 is a content server that supports a search engine, and can represent, for example a server or cluster of servers supporting, in this example, the Panoramio website (www.panoramio.com). It should also be appreciated that the above description of the server 150 is intended only to be illustrative of the resources supporting the Panoramio website and the skilled person will appreciate that other implementations may be employed.

In this example, the navigation apparatus 200 is also capable of independently establishing a data session, if required, with network hardware of a communications network, for example a "mobile" communications network via a wireless communications terminal (not shown), such as a mobile telephone, PDA, and/or any device with mobile telephone technology, in order to establish a digital connection, for example a digital connection via known Bluetooth technology. Thereafter, through its network service provider, the mobile terminal or user equipment can establish a network connection (through the Internet for example) with the server 150. As such, a "mobile" network connection can be established between the navigation apparatus 200 (which can be, and often times is, mobile as it travels alone and/or in a vehicle) and the server 150 to provide a "real-time" or at least very "up to date" gateway for information.

In this example, the navigation apparatus 200 is a Bluetooth enabled navigation apparatus in order that the navigation apparatus 200 can be agnostic to the settings of the wireless communications terminal, thereby enabling the navigation apparatus 200 to operate correctly with the ever changing spectrum of mobile telephone models, manufacturers, etc. Model/manufacturer specific settings can, for example, be stored on the navigation apparatus 200, if desired. The data stored for this information can be updated.

Although not shown, instead of requiring the wireless communications terminal to provide access to the communications network, the navigation apparatus 200 can, of course, comprise mobile telephone technology, including an antenna, for example, or optionally using an internal antenna of the navigation apparatus 200. The mobile telephone technology within the navigation apparatus 200 can also include an insertable card (e.g. Subscriber Identity Module (SIM) card). As such, mobile telephone technology within the navigation apparatus 200 can similarly establish a network connection between the navigation apparatus 200 and the server 150, via the Internet

for example, in a manner similar to that of any wireless communications-enabled terminal.

As explained above, the establishing of the network connection between the mobile device (via a service provider) and another device such as the server 150, using the Internet for example, can be done in any suitable known manner. In this respect, any number of appropriate data communications protocols can be employed, for example the TCP/IP layered protocol. Furthermore, the mobile device can utilize any number of communication standards such as CDMA2000, GSM, IEEE 802.11 a/b/c/g/n, etc.

Hence, it can be seen that the Internet connection can be utilised, which can be achieved via a data connection using the mobile telephone or mobile telephone technology.

Referring to Figure 3, it should be noted that the block diagram of the navigation apparatus 200 is not inclusive of all components of the navigation apparatus, but is only representative of many example components. The navigation apparatus 200 is located within a housing (not shown). The navigation apparatus 200 includes a processor 202, the processor 202 being coupled to an input device 204 and a display device, for example a display screen 206. Although reference is made here to the input device 204 in the singular, the skilled person should appreciate that the input device 204 represents any number of input devices, including a keyboard device, voice input device, touch panel and/or any other known input device utilised to input information. Likewise, the display screen 206 can include any type of display screen such as a Liquid Crystal Display (LCD), for example.

In one arrangement, one aspect of the input device 204, the touch panel, and the display screen 206 are integrated so as to provide an integrated input and display device, including a touchpad or touchscreen input to enable both input of information (via direct input, menu selection, etc.) and display of information through the touch panel screen so that a user need only touch a portion of the display screen 206 to select one of a plurality of display choices or to activate one of a plurality of virtual or “soft” buttons. In this respect, the processor 202 supports a Graphical User Interface (GUI) that operates in conjunction with the touchscreen.

In the navigation apparatus 200, the processor 202 is operatively connected to and capable of receiving input information from input device 204 via a connection 210, and operatively connected to at least one of the display screen 206 and an output device 208, via respective output connections 212, to output information thereto. The output device 208 is, for example, an audible output device (e.g. including a loudspeaker). As

the output device 208 can produce audible information for a user of the navigation apparatus 200, it should equally be understood that input device 204 can include a microphone and software for receiving input voice commands as well. Further, the navigation apparatus 200 can also include any additional input device 204 and/or any additional output device, such as audio input/output devices for example. The processor 202 is operably coupled to a memory resource 214 via connection 216 and is further adapted to receive/send information from/to input/output (I/O) ports 218 via connection 220, wherein the I/O port 218 is connectible to an I/O device 222 external to the navigation apparatus 200. The memory resource 214 comprises, for example, a volatile memory, such as a Random Access Memory (RAM) and a non-volatile memory, for example a digital memory, such as a flash memory. The external I/O device 222 may include, but is not limited to an external listening device, such as an earpiece for example. The connection to I/O device 222 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 earpiece or headphones, and/or for connection to a mobile telephone for example, wherein the mobile telephone connection can be used to establish the data connection between the navigation apparatus 200 and the server 150 via the Internet or any other network for example.

Figure 3 further illustrates an operative connection between the processor 202 and an antenna/receiver 224 via connection 226, wherein the antenna/receiver 224 can be a GPS antenna/receiver for example. It should be understood that the antenna and receiver designated by reference numeral 224 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.

It will, of course, be understood by one of ordinary skill in the art that the electronic components shown in Figure 3 are powered by one or more 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 3 are contemplated. For example, the components shown in Figure 3 may be in communication with one another via wired and/or wireless connections and the like. Thus, the navigation apparatus 200 described herein can be a portable or handheld navigation apparatus 200.

Turning to Figure 4, the memory resource 214 stores a boot loader program (not shown) that is executed by the processor 202 in order to load an operating system 262 from the memory resource 214 for execution by functional hardware components 260,

which provides an environment in which application software 264 can run. The operating system 262 serves to control the functional hardware components 260 and resides between the application software 264 and the functional hardware components 260. The application software 264 provides an operational environment including the GUI that supports core functions of the navigation device 200, for example map viewing, route planning, navigation functions and any other functions associated therewith. Part of the application software 264 comprises an object retriever module 266.

In operation of a first embodiment, a user of the client terminal 170, having already connected the navigation apparatus 200 to the client terminal 170, executes a device management application 171 that has been previously installed on the navigation apparatus 200. The device management application 171 comprises an object retriever extension (not shown), the functionality of which will now be described.

Referring to Figure 5, the user starts (Step 400) the device management application 171 as described above. From a drop down menu of the device management application 171, the user selects an image location search facility, thereby executing the object retriever extension. With additional reference to Figure 6, the device management application 171 then displays, via a user interface of the client terminal 170, a search interface 500 that uses the facilities of the Panoramio server 150. The server 150 supports an Application Programming Interface (API) that permits search requests for, at least, image and corresponding location information to be serviced by the server 150. In this example, the API permits the submission of information to the server 150 including, for example, co-ordinate information constituting a location–related criterion, and which defines, in this example a geographical area, such as a rectangular area. Consequently, the user provides (Step 402), via a textual input box 502, a name of a location in the vicinity of which a location is sought, for example “Guildhall Yard, London”. The user then clicks on a “Get Pictures” virtual button 504, resulting in the object retriever extension accessing a so-called geocoding server that is remote from the client terminal 170 and returns a list of addresses and corresponding geographical location coordinates, for example longitude and latitude coordinates, the list of addresses being sorted based upon a ranking reflecting a degree of match with the name of the location provided by the user in the textual input box 502. The object retriever extension then selects the first address and associated coordinates in the list of addresses returned constituting the highest ranked address,

In this example, a buffer area is predetermined and stored in relation to the object retriever extension, for example 2 km square, and is used to calculated the buffer area that comprises the coordinates obtained in relation to the location specified by the

user ("Guildhall Yard, London"). The buffer area is defined, in this example, by coordinates such that the location specified by the user is substantially centrally located within the buffer area. The rectangular area constitutes a location-related criterion. Using the API of the Panoramia server 150, the object retriever extension then generates (Step 404) a request/response message, for example an HTTP GET message, conforming to the API and specifying the buffer area and any other required criterion mandated by this known API. The HTTP GET message is then sent (Step 406) to the server 150. An example of the HTTP GET message, although not corresponding to the above specific location, is:

http://www.panoramio.com/map/get_panoramas.php?order=popularity&set=public&from=0&to=5&size=small&minx=4.890899772644043&miny=52.3607112121582&maxx=4.900899772644043&maxy=52.370711212158206.

In accordance with normal operation thereof, the server 150, using the buffer area specified above, searches the data store 160 in order to obtain object data, in this example image data and other suitable data stored and associated with the object data, where the associated location data conforms to the buffer area (and any other criteria) specified in the HTTP GET message.

The object retriever extension awaits (Step 408) receipt of results generated as described above by the server 150. In this respect, the server 150 following retrieval of relevant data store 160, organises the relevant data as results data and sends the results data to the device management application 171. An example of the results data sent by the server 150 in response to the request from the object retriever extension, although not corresponding to the location specified by the user, is:

{ "count": 1276,
"photos": [{"photo_id": 6156378, "photo_title": "The Secret Garden", "photo_url": "http://www.panoramio.com/photo/6156378", "photo_file_url": "http://mw2.google.com/mw-panoramio/photos/small/6156378.jpg", "longitude": 4.892862, "latitude": 52.363275, "width": 165, "height": 240, "upload_date": "26 November 2007", "owner_id": 1136666, "owner_name": "Senex Prime", "owner_url": "http://www.panoramio.com/user/1136666"}
,
{"photo_id": 34362, "photo_title": "por qué todos tienen en donde dormir y nosotras noooooo?", "photo_url": "http://www.panoramio.com/photo/34362", "photo_file_url":

"http://mw2.google.com/mw-panoramio/photos/small/34362.jpg", "longitude": 4.896845, "latitude": 52.366258, "width": 240, "height": 160, "upload_date": "24 July 2006", "owner_id": 4835, "owner_name": "Lizette", "owner_url": "http://www.panoramio.com/user/4835"}
,
{"photo_id": 3627329, "photo_title": "Panorámica de Muntplein. Amsterdam.", "photo_url": "http://www.panoramio.com/photo/3627329", "photo_file_url": "http://mw2.google.com/mw-panoramio/photos/small/3627329.jpg", "longitude": 4.893422, "latitude": 52.367005, "width": 240, "height": 180, "upload_date": "30 July 2007", "owner_id": 11001, "owner_name": "Arturo García", "owner_url": "http://www.panoramio.com/user/11001"}
,
{"photo_id": 253437, "photo_title": "Sul canale 1, Amstel river, Amsterdam agosto 1996", "photo_url": "http://www.panoramio.com/photo/253437", "photo_file_url": "http://mw2.google.com/mw-panoramio/photos/small/253437.jpg", "longitude": 4.898615, "latitude": 52.366940, "width": 162, "height": 240, "upload_date": "28 December 2006", "owner_id": 18925, "owner_name": "Marco Ferrari", "owner_url": "http://www.panoramio.com/user/18925"}
,
{"photo_id": 6054438, "photo_title": "Sunset Panorma at Amstel", "photo_url": "http://www.panoramio.com/photo/6054438", "photo_file_url": "http://mw2.google.com/mw-panoramio/photos/small/6054438.jpg", "longitude": 4.898572, "latitude": 52.367267, "width": 240, "height": 73, "upload_date": "21 November 2007", "owner_id": 180363, "owner_name": "AustrianAviationArt", "owner_url": "http://www.panoramio.com/user/180363"}
]}

Thereafter, the object retriever extension uses the results data received in order to access the images identified in the results data and other relevant data in order to present (Step 410) results in a results pane 506, including the images accessed 508, the respective names of the locations 510 and any other necessary information 512. Adjacent each results entry, the object retriever extension provides an “Add to Favourite” virtual button 514. The user interface associated with the device management application 171 thereby provides access by the user to the location identifying data for use in relation to a navigation-related function, for example a function that permits setting of a favourite location. The navigation-related function is supported by the

application software 264 of the navigation apparatus 200. The object retriever extension therefore supports selection of the location identifying data associated with the object.

In this example, the user is interested in setting the location of the Bank of England, in the UK, as a favourite location in the navigation apparatus 200. The user therefore selects (Step 412) the "Add to Favourite" virtual button 514 corresponding to the image of the Bank of England and the object retriever extension initiates (Step 414), in this example, the functionality associated with setting the favourite location, because the device management application 171, in this example, is capable of providing a remote interface for operating the navigation apparatus 200 connected to the client terminal 170. The object retriever extension provides the coordinates and name of the location selected by the user and the navigation apparatus 200 then adds (Step 416) the details provided to a list of favourites maintained by the navigation apparatus 200 and confirms setting of the favourite location (Figure 7). In the event that the navigation apparatus 200 is not connected to the client terminal 170, the device management application 171 can implement the setting of the selected coordinates as a favourite location when the navigation apparatus 200 is next connected to the client terminal 170.

It can thus be seen that the device management application 171 can be used to set favourite locations using location information obtained in relation to an object retrieved from a data store of object data enriched with corresponding respective location data. Whilst the above example has been described in the context of performance in relation to the device management application 171, the object retriever module 266 of the navigation apparatus 200 is capable of generating request/response messages and so like functionality can be provided by the navigation apparatus 200 either via the interface of the device management application 171 to control operation of the navigation apparatus 200 when the navigation apparatus 200 is connected to the client terminal 170, or independently when the navigation apparatus 200 is not connected to the client terminal 170 but able to achieve Internet connectivity, for example through wireless communications capabilities of the navigation apparatus 200. In both scenarios, the navigation apparatus 200 and the server 150 constitute the location selection support system.

By way of further examples, the following embodiments will now be described in the context of operation of the navigation apparatus 200 when not connected to the client terminal 170.

Hence, in another embodiment (Figure 8), the navigation-related function comprises route calculation. The user, a visitor to the offices of the European Patent Office in The Hague, located at Patentlaan 2, Rijswijk, requires navigation assistance to

a location near the offices of TomTom International BV located at Rembrandtplein 35, Amsterdam.

In order to implement navigation to the above destination using the navigation apparatus 200, the user configures a route for calculation as follows. Referring to Figures 9 to 19, the user undertakes (Step 420, Figure 8) an illustrative destination location input process described hereinbelow using a location browser function supported by the user interface. Although not shown, the user uses a settings menu option supported by the application software 264 in order to select, in this example, view generation in a three-dimensional mode.

When the user powers-up the navigation apparatus 200, the apparatus 200 acquires GPS data and performs a self-location determination by calculating (in a known manner) the current location of the navigation apparatus 200. The user is then presented, as shown in Figure 9, with a display 340 showing in pseudo three-dimensions: a local environment 342 in which the navigation apparatus 200 is determined to be located and, in a region 344 of the display 340 below the local environment 342, a set of control and status messages.

By touching the display at the local environment 342, the navigation apparatus 200, through the user interface, updates the display 300 by displaying (as shown in Figure 10) a series of virtual or soft buttons 346 by means of which the user can, inter alia, input a destination to which the user wishes to navigate.

By touching the “Navigate to” virtual button 348, the navigation apparatus 200 initiates the route calculation functionality, a part of which comprises a route creation procedure. In accordance with the route creation procedure, the navigation apparatus 200 displays (as shown in Figure 11) a plurality of virtual buttons that are each associated with a different category of selectable destinations. In this instance, the display shows a “home” button that if pressed would set the destination to a stored home location. The “favourite” button, if pressed, reveals a list of destinations that the user has previously stored in the navigation apparatus 200 and if one of these destinations is then selected the destination for the route to be calculated is set to the selected previously stored destination. The “recent destination” soft button, if pressed, reveals a list of selectable destinations held in the memory of the navigation apparatus 200 and to which the user has recently navigated. Selection of one of the destinations populating this list would set the destination location for this route to the selected (previously visited) location. The “point of interest” button, if pressed, reveals a number of options by means of which a user can opt to navigate to any of a plurality of locations, such as Parking lots (car parks), Automatic Teller Machines (ATMs), petrol stations or tourist attractions, that

have been pre-stored in the navigation apparatus 200 as locations to which a user of the navigation apparatus 200 might want to navigate. A triangular "arrow" shaped virtual button provides access to additional sub-menu options relating to the "Navigate to ..." menu option as will be described later herein in further detail, and an "address" button 350 commences a process by which the user can input the street address of the destination to which the user wishes to navigate.

Since the user, in this example, knows the street address of the destination to which the user wishes the navigation apparatus 200 to navigate, it is assumed that the "address" button 350 is operated (by touching the button displayed on the touchscreen) in order to select a location as the destination, whereupon (as shown in Figure 12) the user is presented with a series of address input options: address input by "city centre", by "postcode", by "crossing or intersection" (for example a junction of two roads) and by "street and house number".

In this example, the user knows the street address and house number of the destination and hence selects a "street and house number" virtual button 352 whereupon the user is then presented, as shown in Figure 13, with: a prompt 354 to enter the name of the city to which they wish to navigate, a flag button 356 by means of which the user can select the country in which the desired city is located, and a virtual keyboard 358 that may be operated by the user, if necessary, to input the name of the destination city. In this instance, the user begins to type the word "Amsterdam" and the navigation apparatus 200 therefore responds by providing the user with a list 360 of selectable cites.

The user in this instance wishes to navigate to Amsterdam, and on selection of Amsterdam from the list 360 the navigation apparatus 200 displays, as shown in Figure 14, the virtual keyboard 358 again by means of which the user can input street names, and a prompt 362 for entry of a street name. In this instance, the user begins to type the name of the street in which the destination is located and the navigation apparatus 200 responds by providing the user with a list 364 of selectable street names.

In this example, the user wishes to travel to the street Rembrandtplein and so the user selects "Rembrandtplein" from the displayed list 364.

Once a street has been selected, the navigation apparatus 200 then displays (Figure 15) a restricted, largely numeric, virtual keypad 366 and prompts the user, by means of prompt 368, to enter the street number in the selected street and city to which the user wishes to navigate. If the user has previously navigated to a building number in this street, then that number is initially shown. If, as in this instance, the user wishes to navigate to No. 35, Rembrandtplein, then the user simply needs to type the street

number ("35") using the virtual keypad 366 and then touch a "done" virtual button 370 displayed at the bottom right hand corner of the display 340. If the user should wish to navigate to a different building number in Rembrandtplein, then all the user need do is operate the virtual keypad 366 to input an appropriate building or street number.

In the event that the user decides that navigation to the building number suggested is required, the user touches the "Done" virtual button 370. The user is then prompted (Step 422), as shown in Figure 16, to indicate whether the user wishes to set the destination location by image. In the event that the user does not wish to deviate from the normal mode of destination selection, the application software 264 continues to execute (Step 424) the route calculation technique usually implemented following textual input of a desired destination location. As this functionality is known, further details of this functionality will not be described further for reasons of maintaining simplicity and conciseness of description.

In contrast, should the user wish to set the destination location by image, the application software 264 provides (Step 426) the object retriever module 266 with the coordinates of the location indicated by textual input as described above.

As in the previous example, a buffer area is predetermined and stored in relation to the object retriever module 266, for example 2 km square, and is used to calculated the buffer area that comprises the coordinates obtained in relation to the location specified by the user ("Guildhal Yard, London"). Of course, if desired, the object retriever module 266 can, via the user interface, interrogate the user to input a desired buffer area. Thereafter, the buffer area is defined, in this example, by coordinates such that the location specified by the user is substantially centrally located within the buffer area. The buffer area constitutes a location-related criterion. Using the API of the Panoramia server 150 mentioned above, the object retriever module 266 then generates (Step 428) a request/response message of the type described in relation to the previous embodiment and the message is sent (Step 430) as an HTTP GET message to the server 150.

In accordance with normal operation thereof, the server 150, using the buffer area specified above, searches the data store 160 in order to obtain object data, in this example image data and other suitable data stored and associated with the object data, where the associated location data conforms to the buffer area (and any other criteria) specified in the HTTP GET message.

The object retriever module 266 awaits (Step 432) receipt of results generated as described above by the server 150. In this respect, the server 150 following retrieval of relevant data from the data store 160, organises the relevant data as results data and

sends the results data in the form described above in relation to the previous embodiment to the navigation apparatus 200, and in particular the object retriever module 266.

Thereafter, and also referring to Figure 17, the object retriever module 266 uses the results data retrieved in order to provide (Step 434) a view of the buffer area defined above showing the location textually specified by the user and the locations returned by the server 150. In this example, the view provided shows the locations identified by the server 150 as icons 371 indicative of locations found within the buffer area. However, if the display 206 of the navigation apparatus 200 is competent to do so, thumbnail images can be displayed in the view provided instead of the icons 371.

The user can then select (Step 436) one of the locations identified by icons 371 displayed in the view. Upon selection, the object retriever module 266, via the user interface, displays (not shown) details concerning the location associated with the icon selection, for example in a like manner to a single results entry presented by the device management application in the results pane of Figure 6. However, instead of providing the “Add to Favourite” virtual button 514, the preview can include a “Set as Destination” virtual button and a “Back” virtual button.

Selection of the ”Back” virtual button results simply in reverting to presenting the view of the icons 371 in the buffer area described above, whereas selection of the “Set as Destination” virtual button results in the route calculation functionality receiving the location associated with the image selected as the destination and the route calculation functionality then continues (Step 438) in accordance with the usual route calculation procedure implemented for route calculation solely employing textually input information to identify the destination location.

In this respect, the application software 264 therefore then causes the user interface to present an interrogation message 372 (Figure 18) asking the user whether a particular arrival time is required. If the user should touch a “yes” virtual button, then functionality is invoked that estimates the time required to travel to the destination (after provision by the user of the desired arrival time) and advises the user when they should leave (or if they are running late, should have left) their current location in order to arrive at their destination on time. In this instance, the user is not concerned about arriving at a particular time and hence selects a “no” virtual button 374.

The navigation apparatus 200 then calculates a route between the current location and the selected destination location and displays, via the user interface, a route 386 calculated, as shown in Figure 19. The user is also provided with a “done” virtual button 388 which the user can press to indicate the calculated route is acceptable, a

"find alternative" virtual button 390 that the user can press to cause the navigation apparatus 200 to calculate another route to the selected destination, and a "details" virtual button 392 that a user can press to reveal selectable options for the display of more detailed information concerning the currently displayed route 386.

In this instance, it is assumed that the user considers the displayed route acceptable, and once the "done" button 388 has been pressed the user is presented, with a three-dimensional view (not shown) of the current, start, location for the navigation apparatus 200.

The user then commences their journey and the navigation apparatus 200 guides the user. The navigation apparatus 200 periodically acquires GPS data and performs a self-location determination by calculating (in a known manner) the current location of the navigation apparatus 200. Using the current location information calculated, the navigation apparatus 200, in a known manner, updates the map in accordance with determined changes in location of the navigation apparatus 200, and guides the user by providing visual and, optionally, audible navigation instructions until the destination selected is approaching or reached.

In the above example, a precise textual address was provided by the user, which was used as a basis for querying the server 150. However, if desired, the user can be permitted to submit more general location information, for example a street and city, and use of the geocoding server and data returned thereby can be made in a like manner to that described above in relation to the first embodiment involving the device management application 171 in order to set the buffer area.

In another embodiment, the above embodiment can be accompanied by the following functionality. Alternatively, the following functionality can be provided without the need to select the destination location on the basis of the selection by image interface described above.

Turning to Figure 19, 20 and 21, after the application software 264 has calculated and displayed (Step 450) the calculated route (Figure 19), the object retriever module 266 (optionally) interrogates (Step 452) the user, via the user interface, in order to determine is the user wishes the route preview to be supplemented with icons (or thumbnails if the display is capable) identifying images associated with locations within a predetermined buffer area with respect to the route calculated. In this respect, the buffer area can be predetermined and stored during initial configuration of the navigation apparatus 200, or alternatively the user can be interrogated, again via the user interface, in order to specify a desired buffer area. In the event that the user does not wish to view images relating to locations along the route calculated or within the buffer area relative to

the route calculated, the application software 264 continues (Step 454) with providing navigation assistance in the manner described above. However, if the user wishes the view of the calculated route to be supplemented with image information, the object retriever module 266 segments (Step 456) the calculated route into multiple buffer areas, for example rectangular areas, each having coordinate data specific to the particular segment. The buffer areas each constitute a respective location-related criterion. The object retriever module 266 then sends (Step 458) multiple requests for image and location information in respect of each rectangular area defined.

In accordance with normal operation thereof, the server 150, using the buffer area specified above in turn, searches the data store 160 in order to obtain object data, in this example image data and other suitable data stored and associated with the object data, where the associated location data conforms to the buffer area (and any other criteria) specified in each of the multiple HTTP GET messages received.

The object retriever module 266 awaits (Step 460) receipt of at least one result generated as described above by the server 150. In this respect, the server 150 following retrieval of relevant data store 160, organises the relevant data for each request made as results data and sends each of the results data generated, in the form described above in relation to the previous embodiments, to the navigation apparatus 200, and in particular the object retriever module 266.

Thereafter, and also referring to Figure 21, the object retriever module 266 uses the results data retrieved in order to provide (Step 462) a view of the route calculated 386, but also showing the locations returned by the server 150. In this example, the view provided shows the locations identified by the server 150 as icons 371 indicative of locations found within the buffer areas along the route calculated. However, if the display 206 of the navigation apparatus 200 is competent to do so, thumbnail images can be displayed in the view provided instead of the icons 371.

The user can then select (Step 464) one of the locations identified by icons 371 displayed in the view. Upon selection, the object retriever module 266, via the user interface, displays (not shown) details concerning the location associated with the icon selection, for example in a like manner to a single results entry presented by the device management application in the results pane of Figure 6. However, instead of providing the “Add to Favourite” virtual button 514, the preview can include, for example, a “Set as Waypoint” virtual button and a “Back” virtual button.

Selection of the ”Back” virtual button results simply in reverting to presenting the view of the icons 371 described above, whereas selection of the “Set as Waypoint” virtual button results in the route calculation functionality receiving the location

associated with the image selected as the waypoint. The application software 266 then reverts to the preview comprising the icons 371 described above to allow the user to select other locations as waypoints, if desired. Thereafter, once the user has selected the "Done" virtual button 388, the route calculation functionality then recalculates (Step 466) the route taking into account the waypoints selected and then continues in accordance with the usual route calculation and navigation procedures described above.

In a further embodiment, construction of an itinerary list by the user can be assisted by the provision of image data and associated location data. Referring to Figures 22, 23 and 24, the user negotiates the main menu of Figure 10 by navigating to screen 3/3 of the main menu (Figure 23) and then selects an "Itinerary Planning" virtual button 393, whereafter the application software 264 displays, via the user interface, an itinerary creation view 394 (Figure 24). By selecting an "Add" virtual button 395 in the itinerary creation view 394, the user is able to select a location as an itinerary list item via an input process akin to that described above in relation to Figures 11 to 15. Although not shown, the user is also able to make use of other menu options that permit the user, for example, to use the location selected as a waypoint or a destination. In any event, after the user has selected (Step 470) a location as an itinerary entry, the application software 264 provides the object retriever module 266 with the coordinates of the location indicated by textual input as described above.

As in the previous example, a buffer area is predetermined and stored in relation to the object retriever module 266. However, in this example, the buffer area is set to a relatively small area, for example, a square 100m x 100m area, as the purpose of obtaining image data in this example is to assist the user in determining whether the location selected for inclusion in the itinerary is acceptable to the user. Thereafter, and using the API of the Panoramia server 150 mentioned above, the object retriever module 266 then generates a request/response message of the type described in relation to the previous embodiments and the message is sent (Step 472) as an HTTP GET message to the server 150.

In accordance with normal operation thereof, the server 150, using the rectangular area specified above, searches the data store 160 in order to obtain object data, in this example image data and other suitable data stored and associated with the object data, where the associated location data conforms to the buffer area (and any other criteria) specified in the HTTP GET message.

The object retriever module 266 awaits (Step 474) receipt of results generated as described above by the server 150. In this respect, the server 150 following retrieval of relevant data from the data store 160, organises the relevant data as results data and

sends the results data in the form described above in relation to the previous embodiments to the navigation apparatus 200, and in particular the object retriever module 266. Upon receipt of the results data from the server 150, if only one result is returned, the object retriever module 266, via the user interface, provides (Step 476) an icon 396 adjacent the entry in the itinerary list created. In the event that multiple results are returned by the server 150, the object retriever module 266 selects a result having location data closest to the location selected as the itinerary item.

The user can then select (Step 478) one of the locations in the itinerary list tagged with the icon 396 and displayed in the view. However, if the display 206 of the navigation apparatus 200 is competent to do so, thumbnail images can be displayed in the view provided instead of the icons 371.

Upon selection, the object retriever module 266, via the user interface, displays (not shown) details concerning the location associated with the icon selection, for example in a like manner to a single results entry presented by the device management application in the results pane of Figure 6. However, instead of providing the “Add to Favourite” virtual button 514, the preview can include, for example, a “Remove from Itinerary” virtual button and a “Back” virtual button (Step 480).

Selection of the ”Back” virtual button results simply in reverting (Step 484) to presenting the view of the itinerary list of Figure 24 described above, whereas selection of the “Remove from Itinerary” virtual button results in the application software 264 removing (Step 482) the itinerary item corresponding to the image being displayed from the itinerary list. The user interface then reverts (Step 484) to the itinerary list view of Figure 24, but does not show the removed itinerary item. Once the user has finished operating on the itinerary list, the user can select a “Done” virtual button 397 to communicate to the application software 264 that the user has finished planning the itinerary.

In yet another embodiment, when using the itinerary planning functionality, the application software 264 can provide the user with an option to view images of locations along a route calculated from the current location to a final location of the itinerary planned so far. The operation of this functionality is analogous to the functionality described in relation to the embodiment of Figure 21, whereby the route calculated is segmented into multiple buffer areas and the multiple buffer areas are used to obtain image and location data relating to locations along the route calculated. The buffer areas each constitute a respective location-related criterion. As in relation to the embodiment associated with Figure 21, the user can select one or more of the images or icons displayed and select the location as a waypoint on the strength of the image displayed in

association with the location. The selected location can then be added to the itinerary. However, in contrast with the embodiment of Figure 21, the location selected can alternatively be selected as a destination location.

Hence it can be seen from the above two embodiments that the itinerary list can be modified using the above functionality, the functionality associated with the itinerary list constituting navigation-related functionality.

It will also be appreciated that whilst various aspects and embodiments of the present invention have heretofore been described, the scope of the present invention is not limited to the particular arrangements set out herein and instead extends to encompass all arrangements, and modifications and alterations thereto, which fall within the scope of the appended claims.

For example, if the server 150 is capable of filtering results retrieved from the data store 160 using search criteria, the API can be adapted to support communication of other search criteria constituting additional data, for example attributes of locations, for example names or classes of locations, such as “tourist attractions” or indeed other classes of point of interest, for example petrol or gas stations that may be required en route. Alternatively, the filtering can take place locally and be performed by the application software 264 following receipt of the results data including the additional data to enable filtering. If necessary, in order to perform the filtering effectively, the application software 264 can be arranged to obtain the additional data, for example attribute data, from a locally stored information source or, if not available, from a remote source of location information, for example a remote point of interest database.

Although the above examples have been described in the context of image data, it should be appreciated that the icons or the thumbnails can be used in order to provide access to audible information and/or visual information, for example sound files in the event that the server 150 is capable of providing such audio data.

Also, it should be appreciated that although the above embodiments have been described in relation to a single server 150 requests to multiple servers can be made if available.

From the above-described embodiments, the skilled person should appreciate that the functionality provided to facilitate access to and/or use of location information on the strength of object data reviewed by the user can be implemented in the navigation apparatus 200 and/or the device management apparatus 171 and indeed, when implementing the above-described functionality, the device management apparatus can be perceived as comprising the navigation apparatus from a functional perspective.

Whilst embodiments described in the foregoing detailed description refer to GPS,

it should be noted that the navigation apparatus may utilise any kind of position sensing technology as an alternative to (or indeed in addition to) GPS. For example the navigation apparatus may utilise using other global navigation satellite systems such as the European Galileo system. Equally, it is not limited to satellite based but could readily function using ground based beacons or any other kind of system that enables the device to determine its geographic location.

Alternative embodiments of the invention can be implemented as a computer program product for use with a computer system, the computer program product being, for example, a series of computer instructions stored on a tangible data recording medium, such as a diskette, CD-ROM, ROM, or fixed disk, or embodied in a computer data signal, the signal being transmitted over a tangible medium or a wireless medium, for example, microwave or infrared. The series of computer instructions can constitute all or part of the functionality described above, and can also be stored in any memory device, volatile or non-volatile, such as semiconductor, magnetic, optical or other memory device.

It will also be well understood by persons of ordinary skill in the art that whilst the preferred embodiment implements certain functionality by means of software, that functionality could equally be implemented solely in hardware (for example by means of one or more ASICs (application specific integrated circuit)) or indeed by a mix of hardware and software. As such, the scope of the present invention should not be interpreted as being limited only to being implemented in software.

Lastly, it should also be noted that whilst the accompanying claims set out particular combinations of features described herein, the scope of the present invention is not limited to the particular combinations hereafter claimed, but instead extends to encompass any combination of features or embodiments herein disclosed irrespective of whether or not that particular combination has been specifically enumerated in the accompanying claims at this time.

CLAIMS

1. A navigation apparatus comprising:

a processing resource arranged to support, when in use, an operational environment, the operational environment supporting a user interface;

an object retriever supported by the operational environment, the object retriever being arranged to generate a location-related criterion and to send a request to retrieve object data associated with the location-related criterion; wherein

the object retriever is arranged to receive responsive to the request the object data and location identifying data associated therewith; and

the user interface is arranged to permit review of an object associated with the object data and to permit selection of the location identifying data associated with the object.

2. An apparatus as claimed in Claim 1, wherein the location-related criterion identifies a geographical area.

3. An apparatus as claimed in Claim 2, wherein the geographical area is substantially rectangular.

4. An apparatus as claimed in Claim 1 or Claim 2 or Claim 3, further comprising:

a navigation-related function supported by the operational environment; wherein

the user interface is arranged to support selection of the location identifying data in relation to the navigation-related function.

5. An apparatus as claimed in Claim 4, wherein the navigation-related function is setting of a “favourites” location.

6. An apparatus as claimed in Claim 4, wherein the navigation-related function comprises route calculation.

7. An apparatus as claimed in Claim 6, wherein the navigation-related function further comprises identification of the object along a calculated route.

8. An apparatus as claimed in Claim 6 or Claim 7, wherein the navigation-related function is selection of a destination location for the route calculation.

9. An apparatus as claimed in Claim 4, wherein the navigation-related function is generation of an item of an itinerary.

10. An apparatus as claimed in Claim 4, wherein the navigation-related function is modification of an itinerary.

11. An apparatus as claimed in Claim 9 or Claim 10, wherein the navigation-related function further comprises identification of the object along a route following the itinerary.

12. An apparatus as claimed in any one of the preceding claims, wherein the object is an image.

13. An apparatus as claimed in any one of the preceding claims, wherein the user interface is arranged to show the object as a thumbnail image or represent the object as an icon.

14. An apparatus as claimed in Claim 7 or Claim 11, when dependent upon Claim 2, wherein the route comprises a number of route segments, and the object retriever is arranged to define a number of geographical areas and to send a number of requests respectively in respect of the number of geographical areas.

15. An apparatus as claimed in Claim 14, wherein the object retriever is arranged to receive responsive to the number of requests at least one object data and respective at least one location identifying data associated therewith.

16. An apparatus as claimed in any one of the preceding claims, wherein the object retriever is arranged to receive responsive to the request additional data associated with the object.

17. An apparatus as claimed in Claim 16, wherein the object retriever is arranged to receive responsive to the request a number of object data and respective location identifying data associated therewith; and the object retriever is further arranged to receive a filter criterion via the user interface and to filter the number of object data using the respective additional data associated therewith and the filter criterion.

18. An apparatus as claimed in any one of Claims 1 to 15, wherein the object retriever is arranged to receive via the user interface a filter criterion in addition to the location-related criterion and to include the filter criterion in the request sent in order to retrieve the object data associated with the location-related criterion provided an attribute associated with the object data conforms to the filter criterion.

19. An apparatus as claimed in any one of the preceding claims, wherein the request to retrieve the object data is a search request.

20. A portable navigation device comprising the navigation apparatus as claimed in any one of the preceding claims.

21. A device management apparatus for coupling to a navigation apparatus, the apparatus comprising the navigation apparatus as claimed in any one of Claims 1 to 19.

22. A location selection support system, the system comprising:

a navigation apparatus as claimed in any one of Claims 1 to 19; and

a server apparatus having access to the object data and associated location data, the server apparatus being arranged to mine the object data and associated location data in response to the request to retrieve the object data.

23. A method of supporting location selection, the method comprising:

generating a location-related criterion;

sending a request to retrieve object data associated with the location-related criterion;

receiving responsive to the request the object data and location identifying data associated therewith;

permitting review of an object associated with the object data; and

permitting selection of the location identifying data associated with the object.

24. A computer program element comprising computer program code means to make a computer execute the method as claimed in Claim 23.

25. A computer program element as claimed in Claim 24, embodied on a computer readable medium.

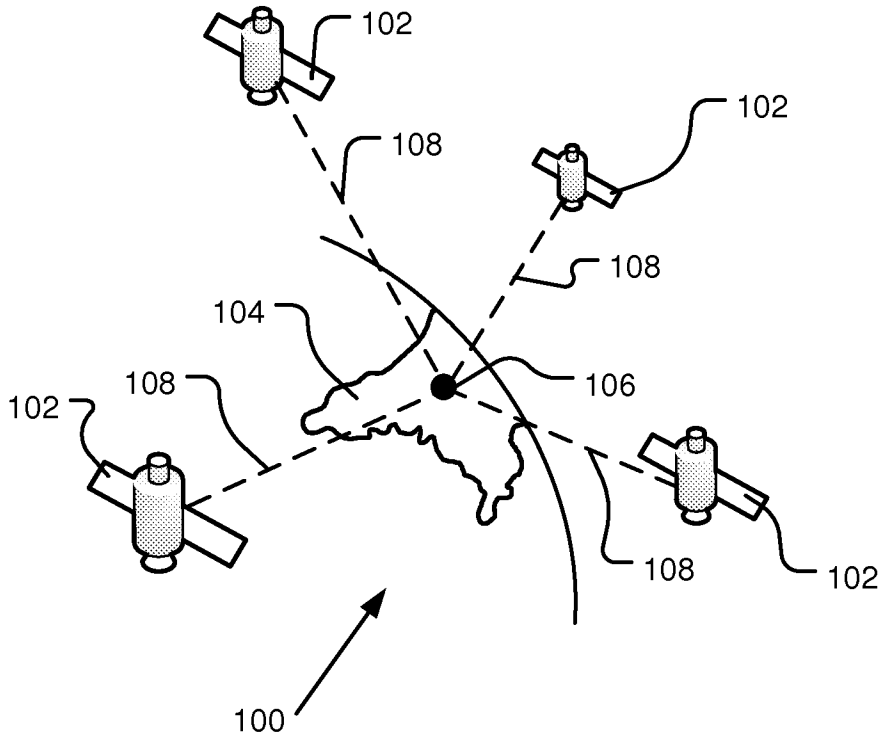


Figure 1

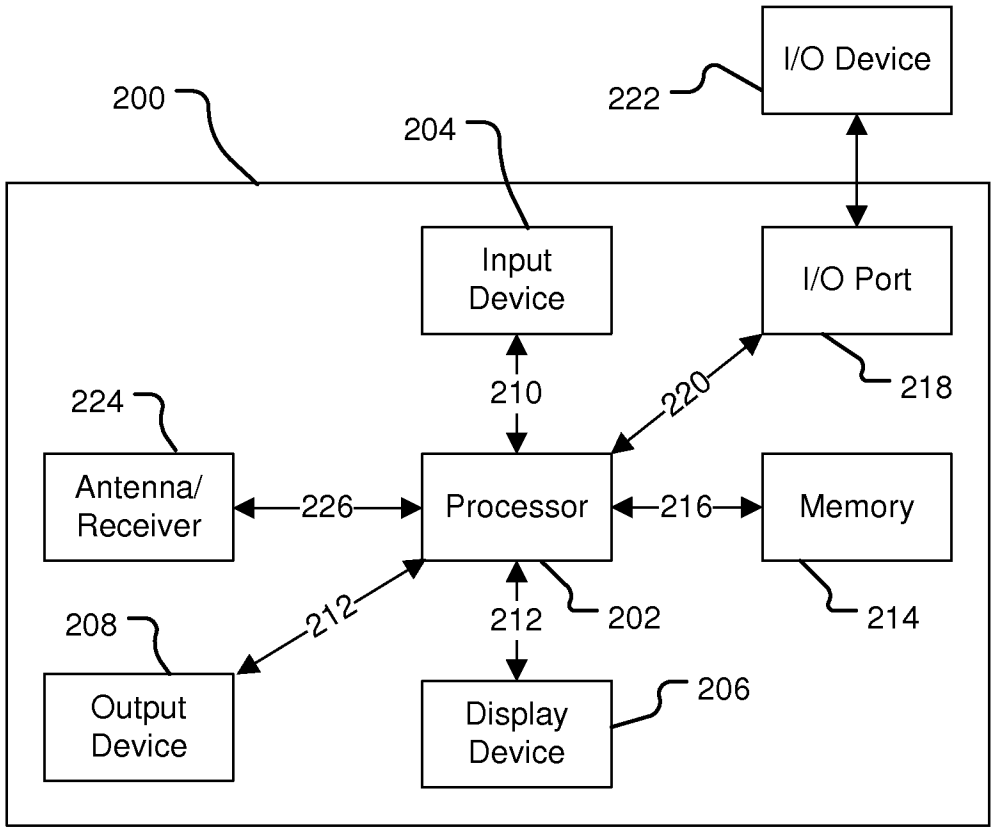


Figure 3

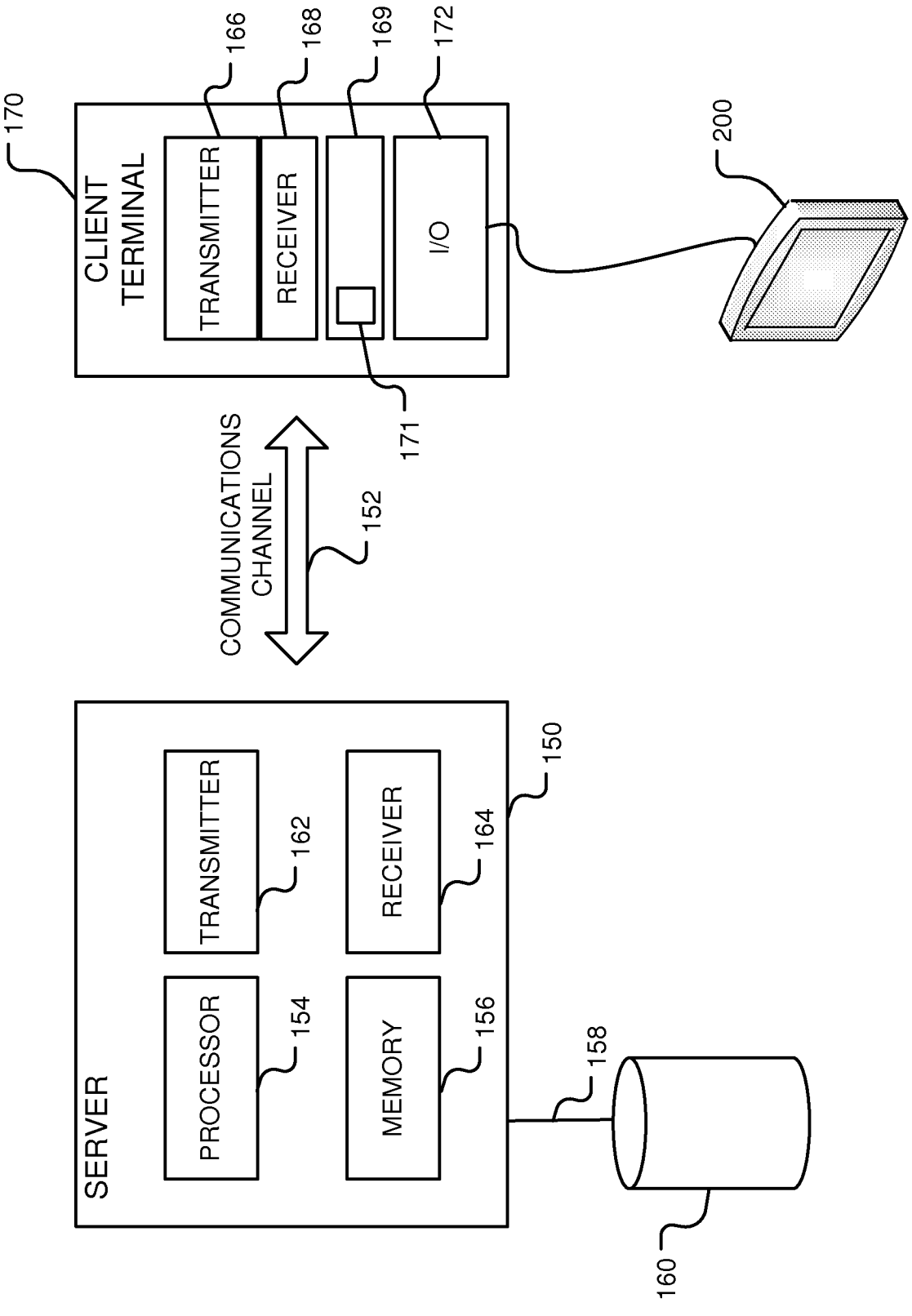

170
CLIENT TERMINAL
TRANSMITTER
RECEIVER
I/O
166
168
169
172
171
200
COMMUNICATIONS CHANNEL
152
SERVER
PROCESSOR
154
TRANSMITTER
162
MEMORY
156
RECEIVER
164
150
158
160

Figure 2

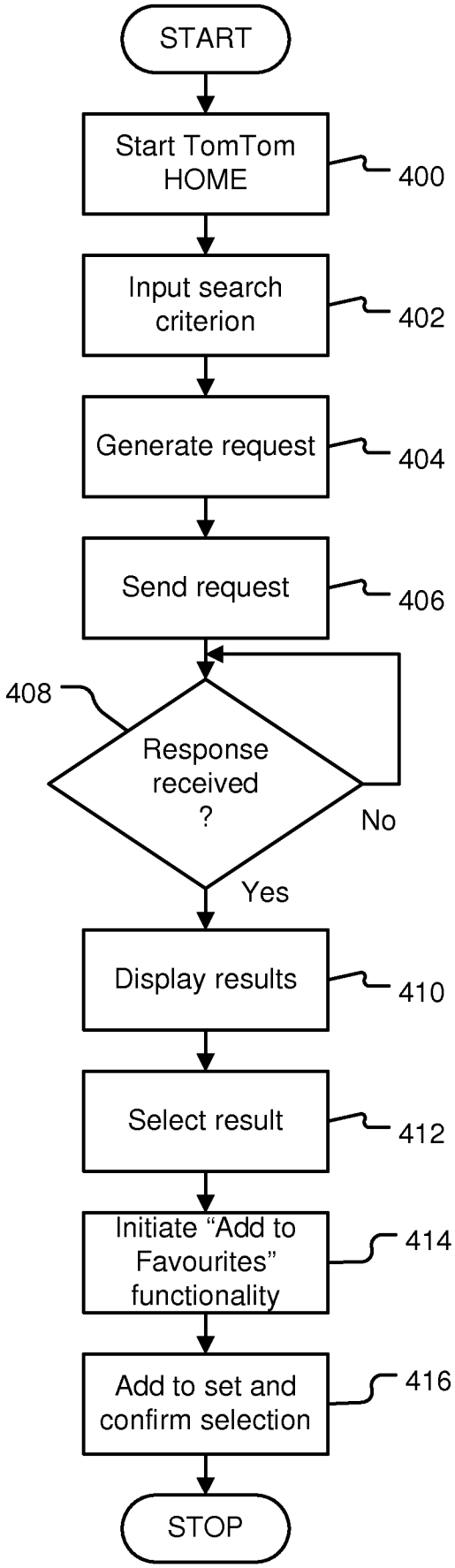

START
Start TomTom HOME
400
Input search criterion
402
Generate request
404
Send request
406
408
Response received ?
No
Yes
Display results
410
Select result
412
Initiate “Add to Favourites” functionality
414
Add to set and confirm selection
416
STOP

Figure 5

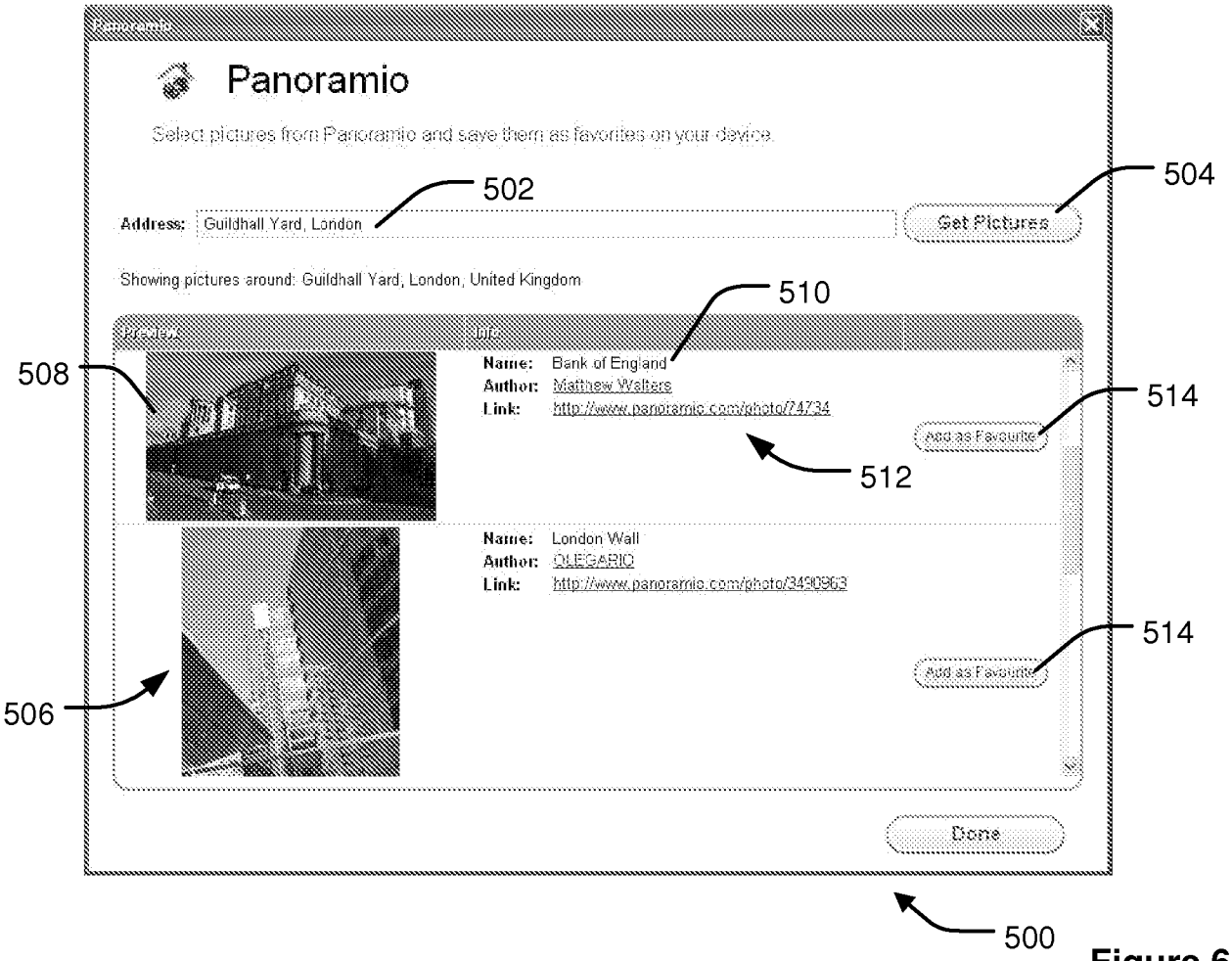


Figure 6

Figure 7

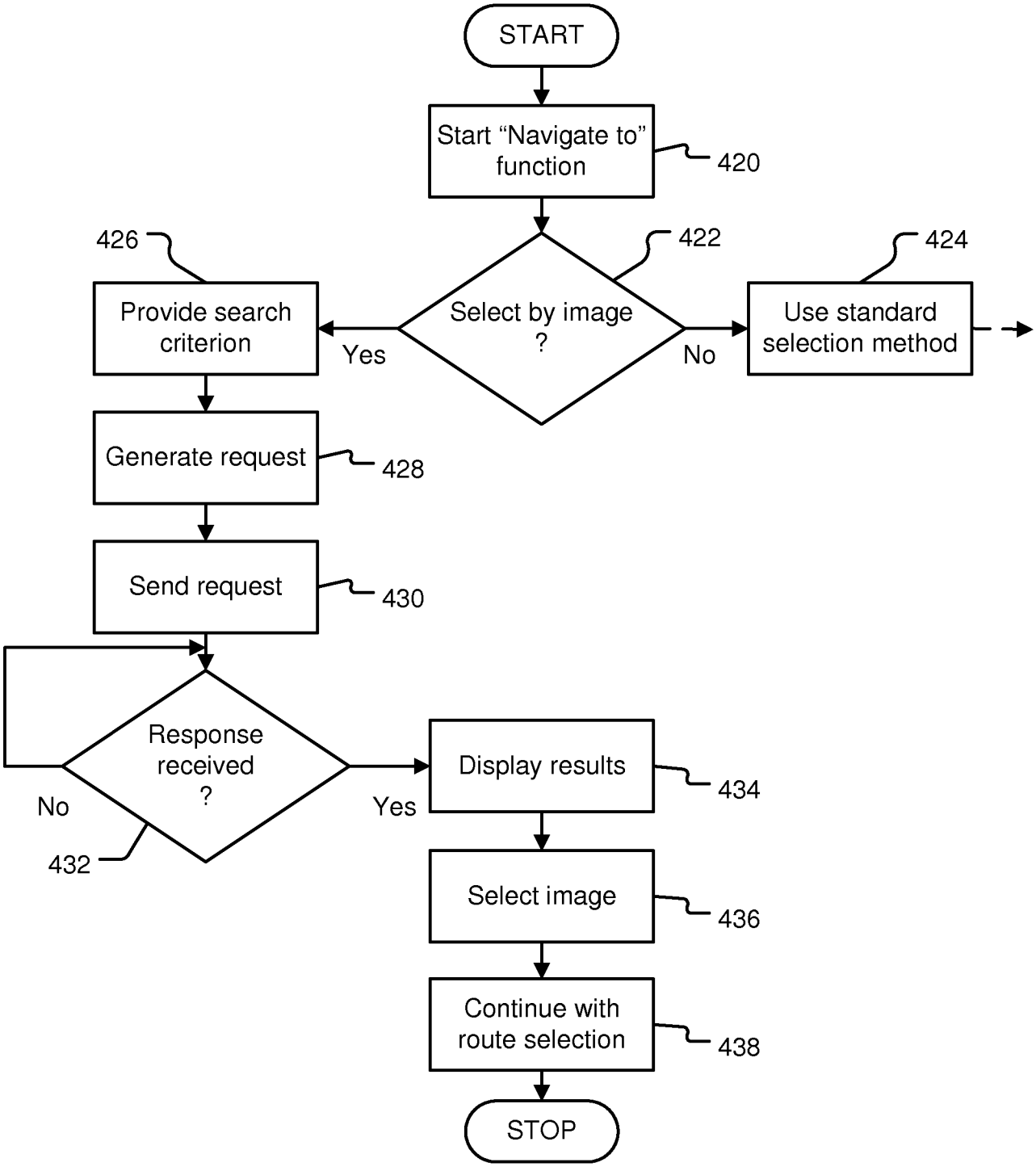

START
Start "Navigate to" function
420
Select by image ?
422
Yes
No
426
Provide search criterion
424
Use standard selection method
Generate request
428
Send request
430
Response received ?
No
Yes
432
Display results
434
Select image
436
Continue with route selection
438
STOP

Figure 8

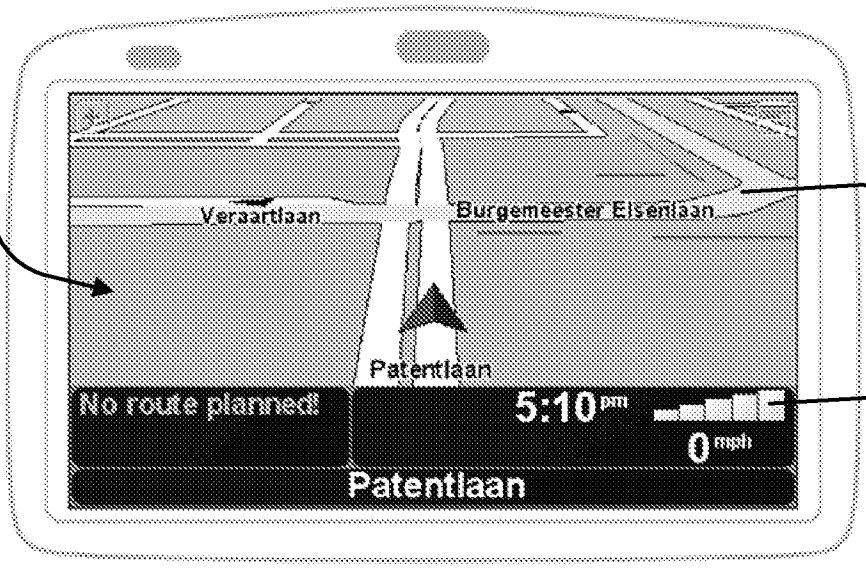


Figure 9

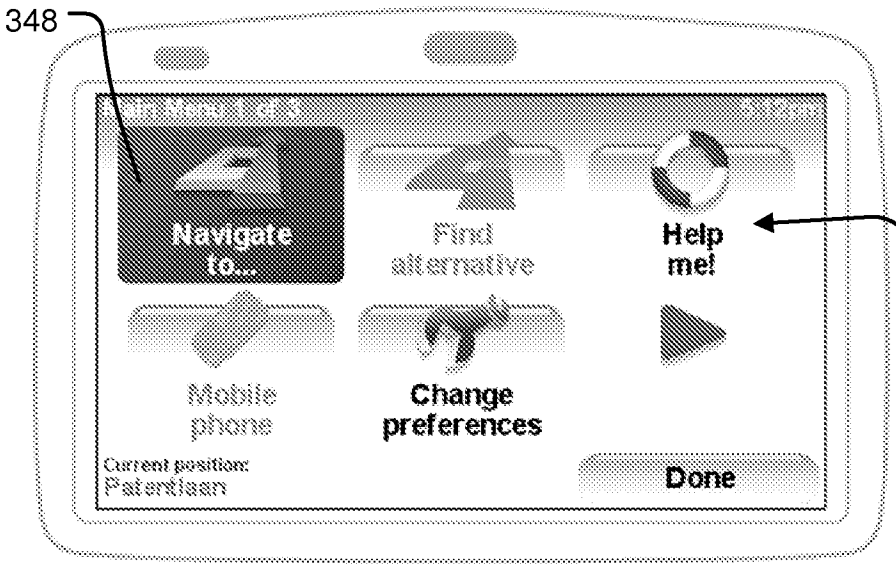


Figure 10

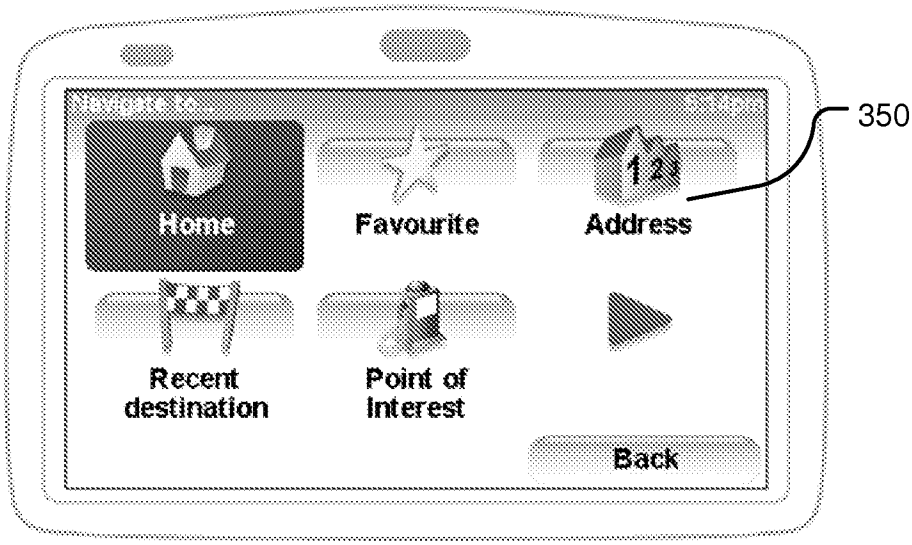


Figure 11

Figure 12

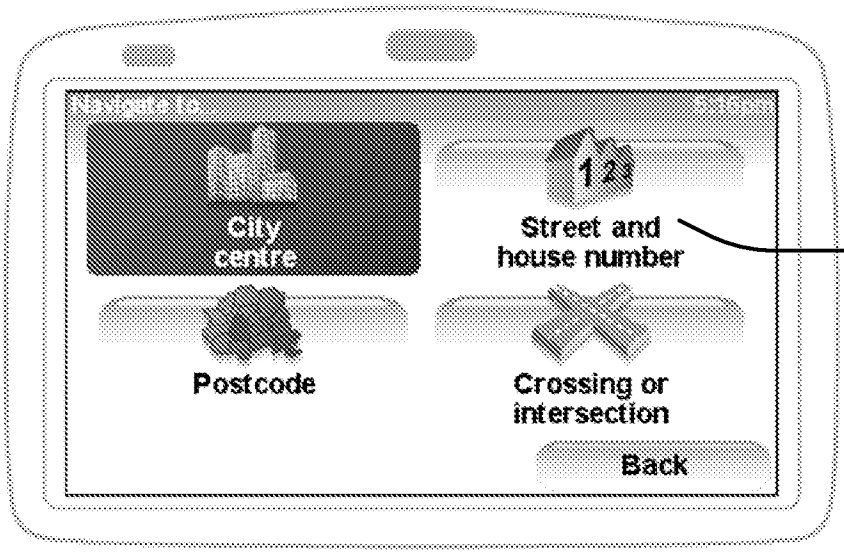
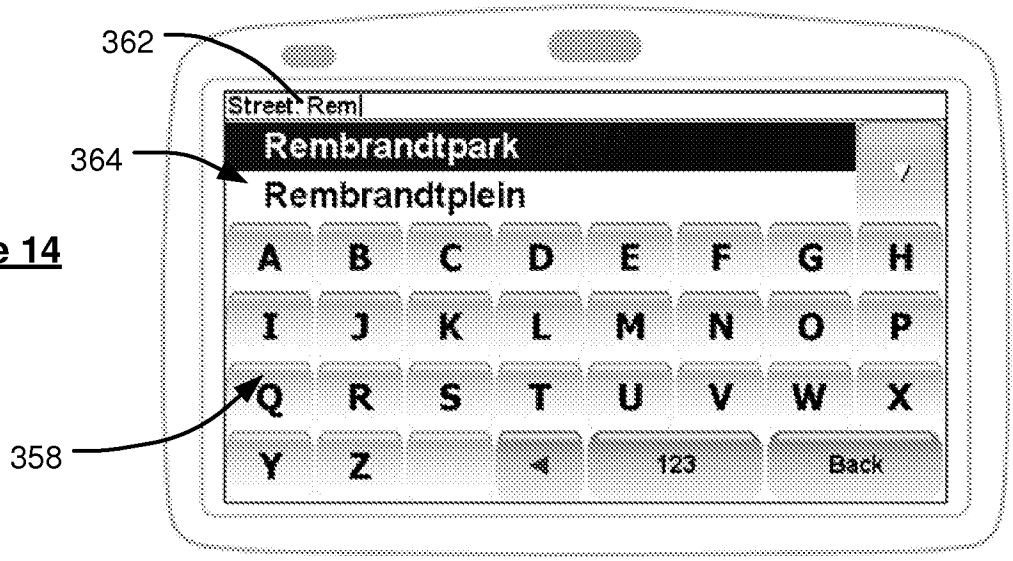


Figure 13

Figure 14



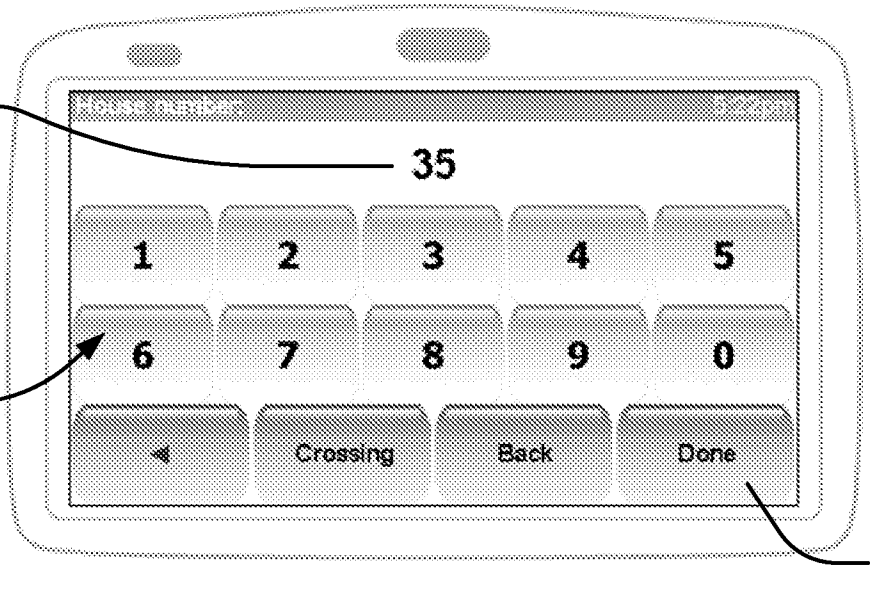


Figure 15

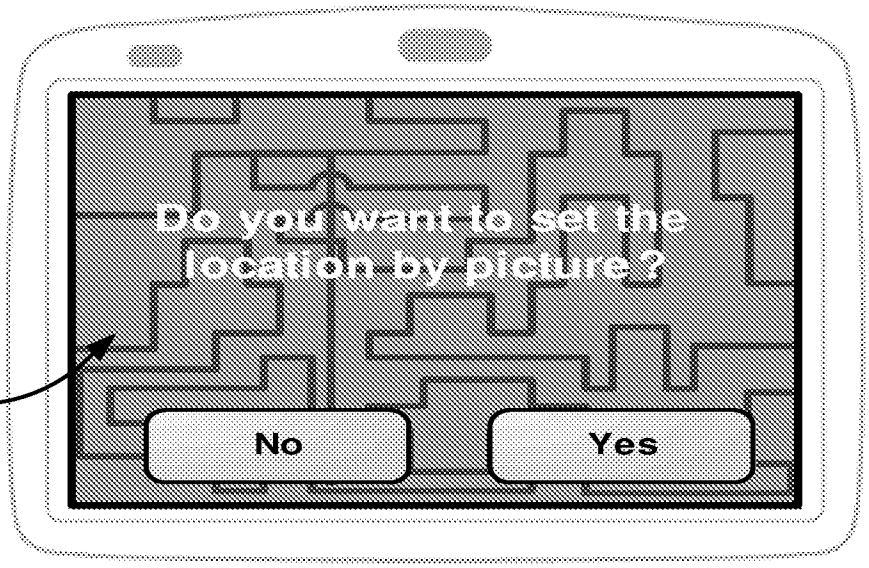


Figure 16

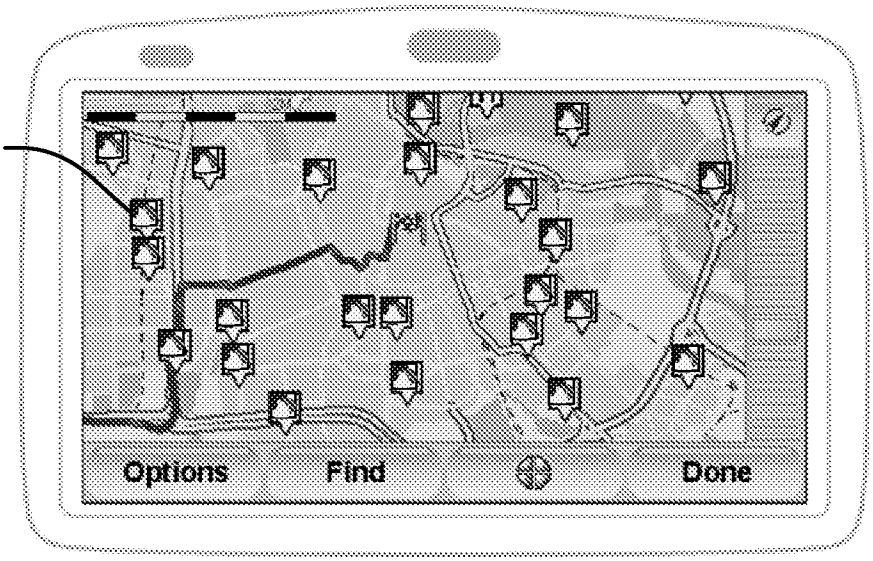


Figure 17

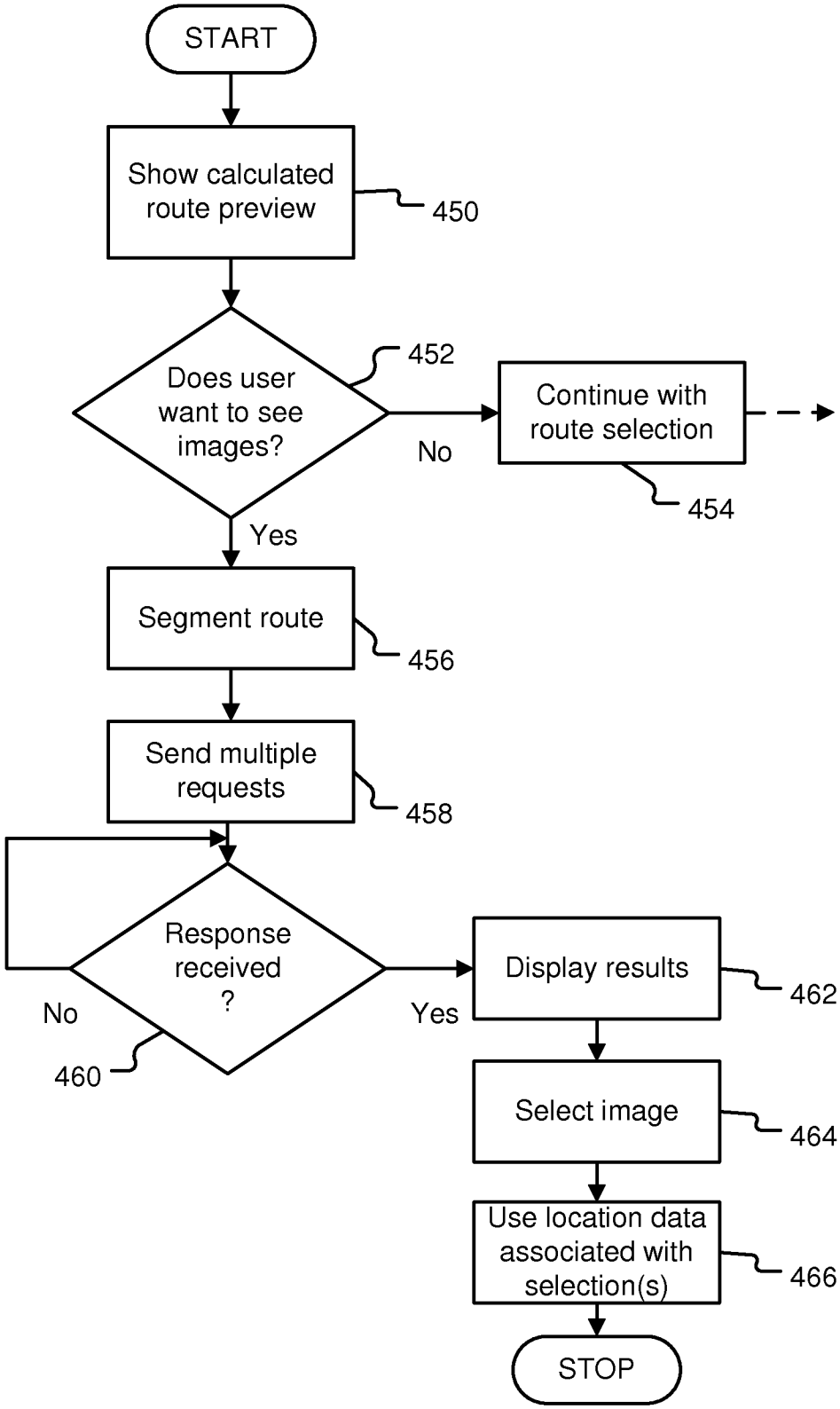

START
Show calculated route preview
450
Does user want to see images?
452
No
Continue with route selection
454
Yes
Segment route
456
Send multiple requests
458
Response received ?
No
460
Yes
Display results
462
Select image
464
Use location data associated with selection(s)
466
STOP

Figure 20

Figure 18

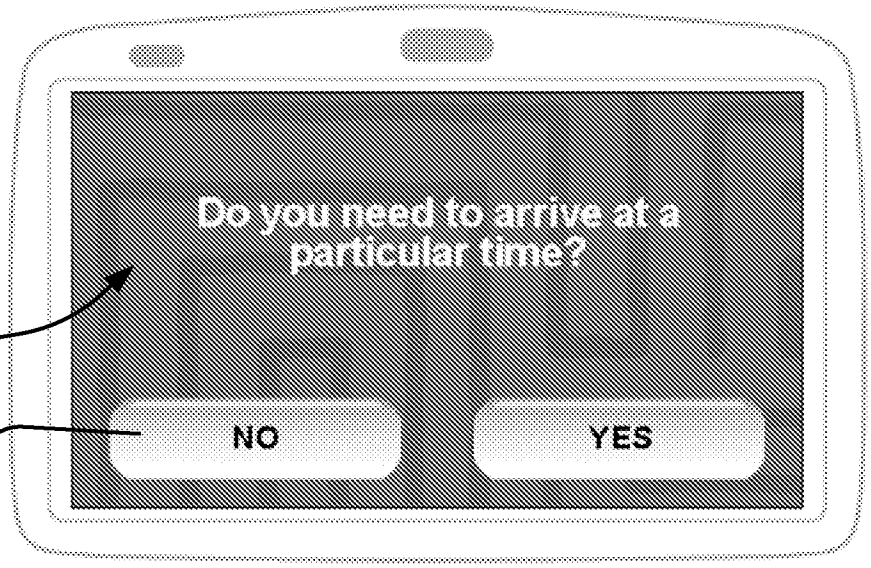


Figure 19

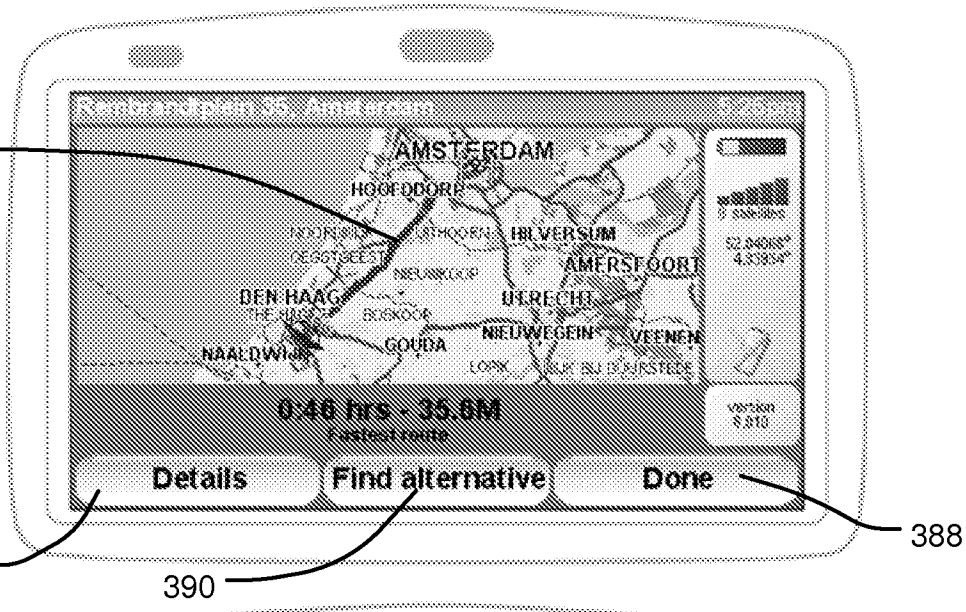
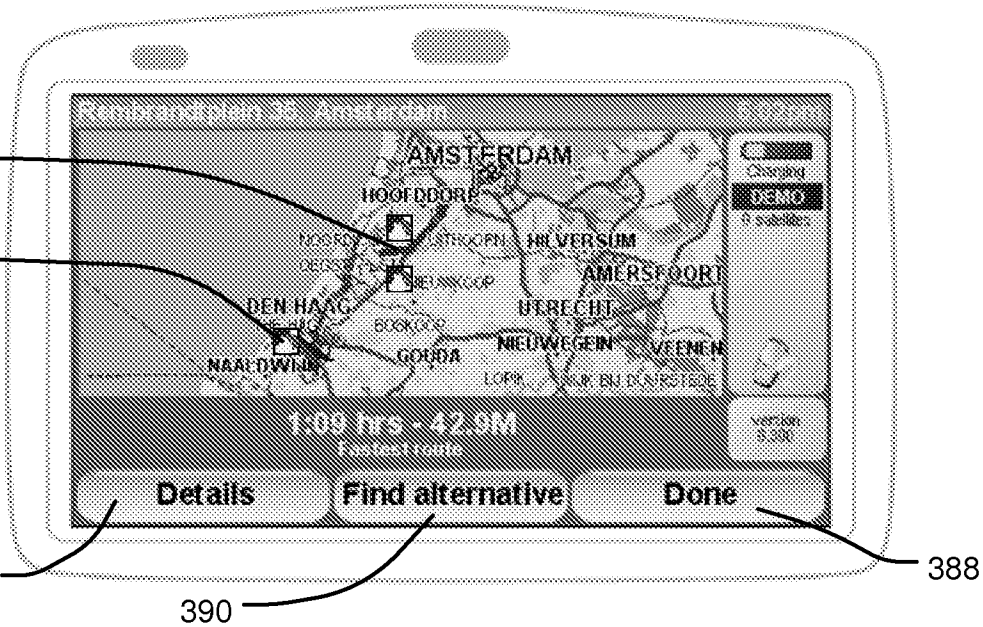


Figure 21



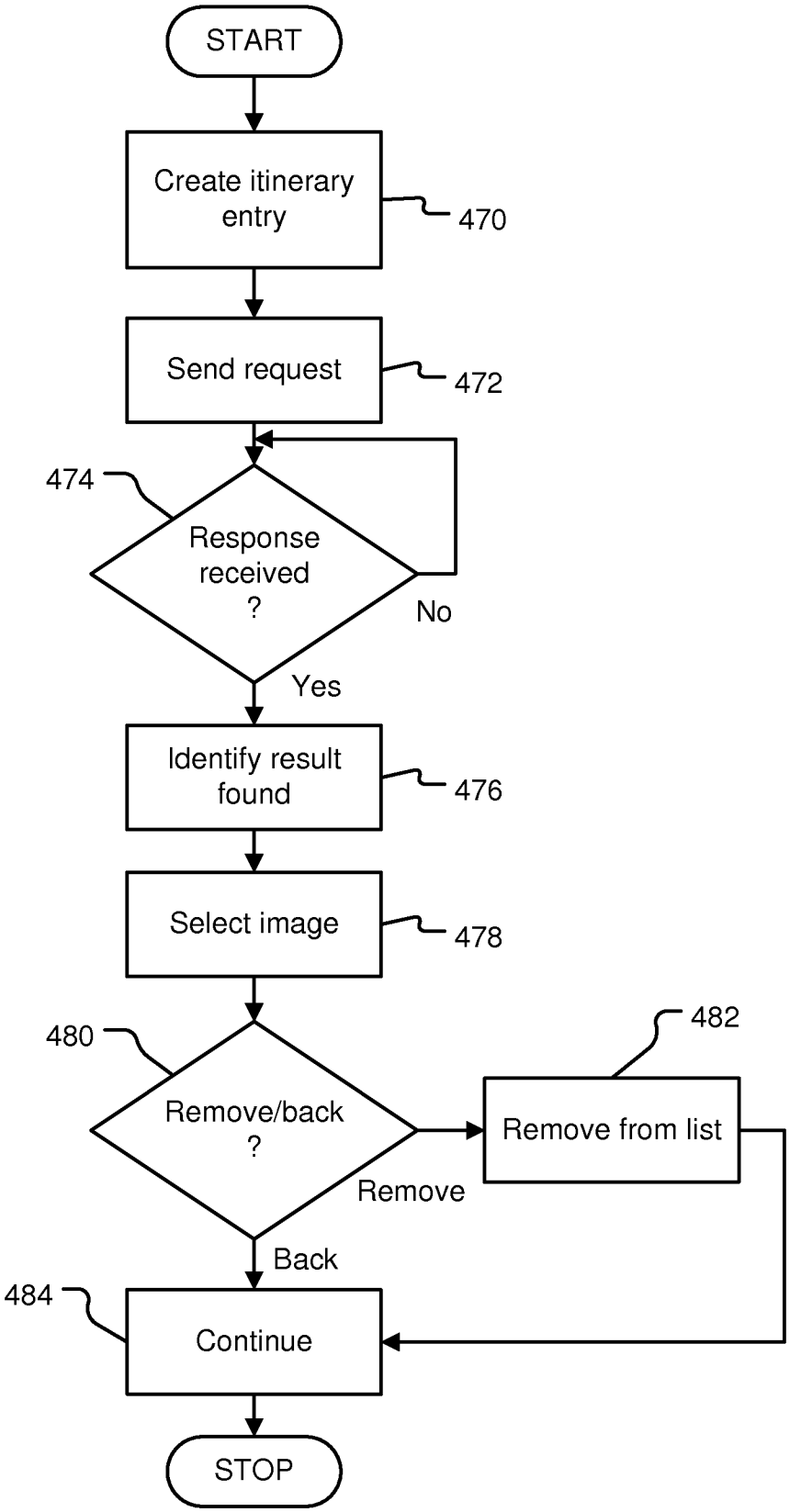

START
Create itinerary entry
470
Send request
472
474
Response received ?
No
Yes
Identify result found
476
Select image
478
480
Remove/back ?
482
Remove from list
Remove
Back
484
Continue
STOP

Figure 22

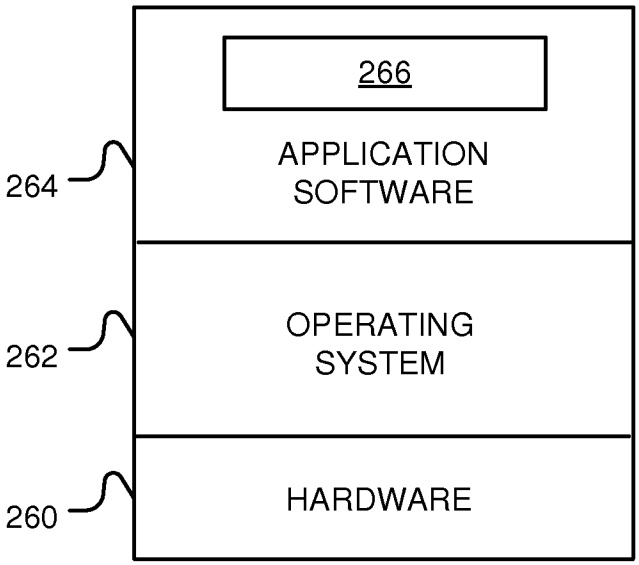


Figure 4

Figure 23

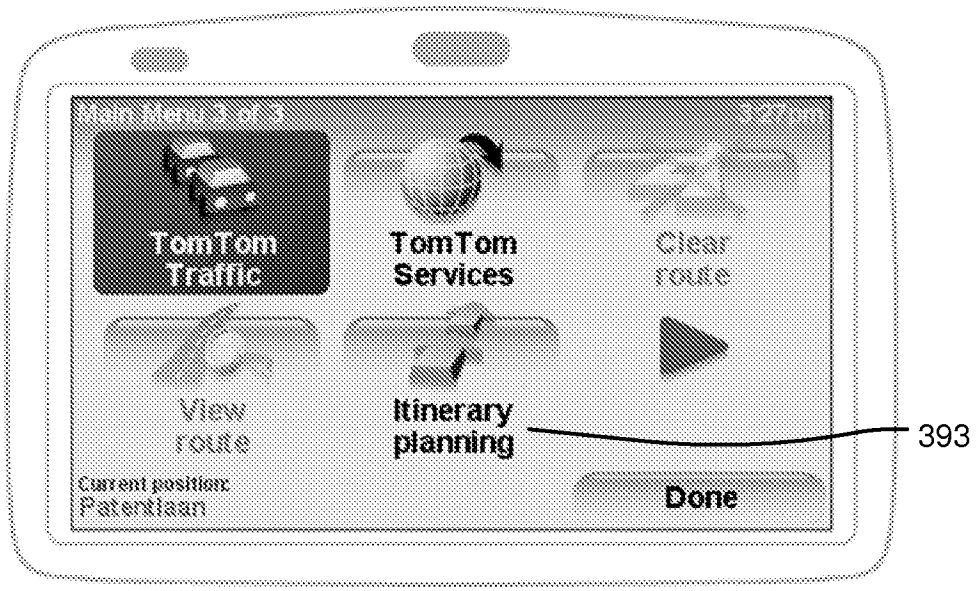
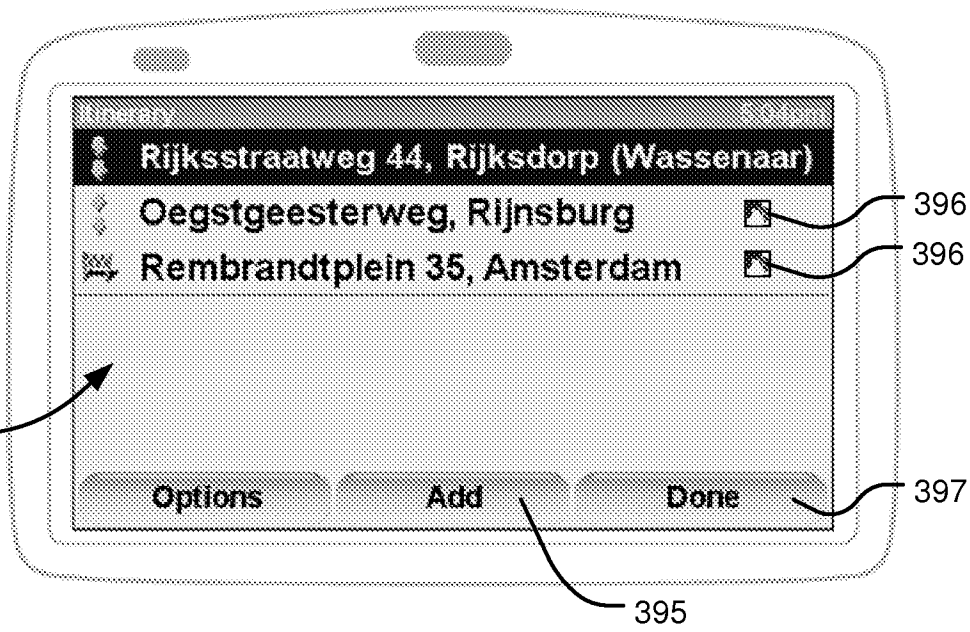


Figure 24



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/050379

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 1 944 578 A (HARMAN BECKER AUTOMOTIVE SYS [DE]) 16 July 2008 (2008-07-16) paragraphs [0015], [0024], [0031], [0032]; claim 34; figure 1	1,2,4, 6-8,12, 16,23-25
X	US 6 466 865 B1 (PETZOLD BERND [DE]) 15 October 2002 (2002-10-15) column 2, line 30 - column 3, line 27; figures 1,5 column 4, lines 4-25	1,2,4, 16-18, 23-25

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

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

"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
10 November 2009	23/11/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	de la Rosa Rivera, E

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/050379

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/089792 A1 (MANBER UDI [US] ET AL) 27 April 2006 (2006-04-27) paragraphs [0002], [0010], [0021], [0029], [0031], [0033], [0034], [0049], [0054] - [0056], [0062] - [0069]; claims 15,19; figures 1A,1C,6,10	1,5, 9-12, 19-25
A	EP 1 990 789 A (NAVITIME JAPAN CO LTD [JP]) 12 November 2008 (2008-11-12) figures 6,8A,8B	13
E	WO 2009/015818 A (VOLKSWAGEN AG [DE]; KIM EDWARD [US]; LEE CHU HEE [US]) 5 February 2009 (2009-02-05) figures 5-8	1,23
E	EP 2 071 289 A (NOKIA CORP [FI]) 17 June 2009 (2009-06-17) figure 5	1,23
E	US 2009/248285 A1 (BAUER LEE [US]) 1 October 2009 (2009-10-01) paragraphs [0022], [0023]; figures 3,4	1,23

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2009/050379

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US 2009248285 A1	01-10-2009	NONE	