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(71) Applicant (for all designated States except US): **TOM-TOM INTERNATIONAL B.V.** [NL/NL]; Rembrandtplein 35, NL-1017 CT Amsterdam (NL).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **ABEN, Sjoerd** [NL/NL]; Tulpstraat 26, NL-1815 XG Alkmaar (NL). **THOMASSEN, Erik** [NL/NL]; Commelinstraat 19c, NL-1093 TG Amsterdam (NL). **DE HAAS, Teun** [NL/NL]; Adelaarstraat 74, NL-3514 CH Utrecht (NL).

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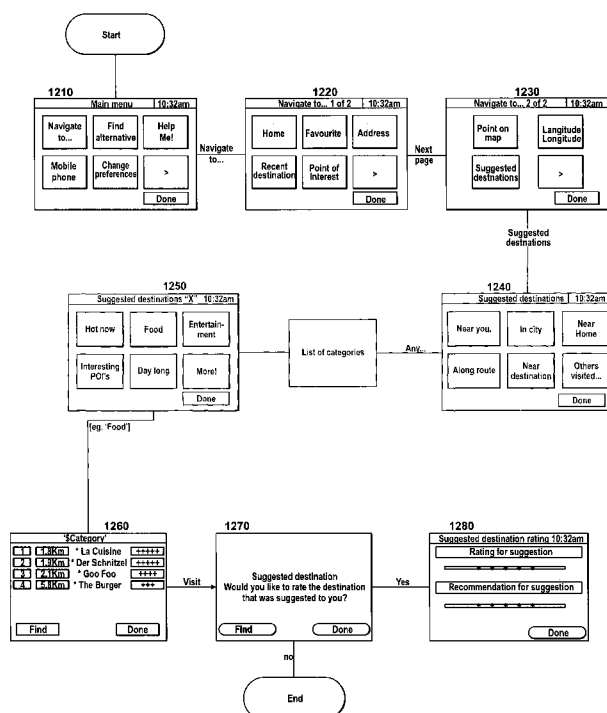
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(54) Title: NAVIGATION DEVICE & METHOD



(57) Abstract: 3. Embodiments of the present invention provide a navigation device (200), characterised by comprising a destination suggestion module (490) arranged to determine one or more suggested destinations from a plurality of suggestible destinations, wherein the suggestible destinations have been determined from journey information obtained from a plurality of navigation devices (200).

Fig. 12



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NAVIGATION DEVICE & METHOD

Field of the Invention

This invention relates to navigation devices and to methods for providing navigation device users with destination information relevant to a current location of the navigation device. Illustrative embodiments of the invention relate to portable navigation devices (so-called PNDs), in particular PNDs that include Global Positioning System (GPS) signal reception and processing functionality. Other embodiments relate, more generally, to any type of processing device that is configured to execute navigation software so as to provide route planning, and preferably also navigation, functionality.

Background to the Invention

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 (at least one of volatile and non-volatile, and commonly both), and map data stored within said memory. The processor and memory cooperate to provide an execution environment in which a software operating system may be 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 could be on a steering wheel if the device is built into a vehicle), and a microphone for detecting user speech. In a particularly preferred arrangement the output interface display may be configured as a touch sensitive display (by means of a touch sensitive overlay or otherwise) to additionally 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 Wi-Fi, Wi-Max GSM and the like.

PND devices 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.

5 The PND device 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
10 navigation systems, but may also be provided in PND devices 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
15 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
20 "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
25 for the factors determining road choice (for example the driver may specify that the route should not include motorways or toll roads).

 In addition, 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
30 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
35 be part of a hand-held system, such as a PDA (Portable Digital Assistant) a media player, a mobile phone 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 to which the user's PC is connected 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.

5 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
10 perform route re-calculation for any reason.

 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
15 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.

20 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
25 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 720T model manufactured and supplied by TomTom International B.V., provide a reliable means for enabling users to navigate from one position to another.

30 A problem has been noted in that a user of a navigation device cannot determine a destination location which they would like to visit. For example, a user of a navigation device may be on holiday and wish to visit a location of interest to them. Whilst a database of points-of-interest (POI) provides a list of notable locations, the user is limited in that without further information or guidance, selection of a location from the POI
35 cannot easily be made.

 It is an aim of the present invention to address this problem, in particular to

attempt to assist users in visiting locations of interest in unfamiliar areas.

Summary of the Invention

In pursuit of this aim, a presently preferred embodiment of the present invention provides a navigation device comprising: a destination suggestion module arranged to provide one or more suggested destinations to a user of the navigation device.

Preferably, the destination suggestion module is arranged to determine the one or more suggested destinations based upon a current location of the navigation device. The destination suggestion module may determine the one or more suggested destinations based, at least in part, on one or more of: a current time, opening hours of each of a plurality of suggestible destinations, a distance to each of the plurality of suggestible destinations, an estimated travelling time to each of the suggestible destinations, user preference information, category information associated with each of the suggestible destinations, and/or a proximity of each suggestible destination to other suggestible destinations.

Preferably, the destination suggestion module is arranged to present the one or more suggested destinations on a display of the navigation device for selection by a user. The navigation device may provide route guidance to a destination selected from amongst the plurality of suggested destinations.

Preferably, the destination suggestion module is arranged to receive a suggestible destinations database. The suggestible destinations database may be received from a server via a communications channel or from a storage medium. The communications channel may include an intermediary computing device, such as a PC. The storage medium may be a memory device. In other embodiments, the destination suggestion module is arranged to transmit a message requesting one or more suggested destinations and to receive a response message indicating the one or more suggested destinations.

Another embodiment of the present invention relates to a method of providing one or more suggested destinations for selection by a user, comprising determining one or more suggested destinations from a plurality of suggestible destinations.

Preferably, the method includes a step of determining the one or more suggested destinations based upon a current location of a navigation device. The method may also include determining the one or more suggestion destinations based, at least in part, on one or more of: a current time, opening hours of each of the suggestible destinations, a distance to each of a plurality of suggestible destinations, an estimated travelling time to each of the suggestible destinations, user preference information, category information associated with each of the suggestible destinations, and/or a proximity of each

suggestible destination to other suggestible destinations.

Preferably, the method may include receiving information indicating a plurality of suggestible destinations. The plurality of suggestible destinations may form a suggestible destinations database, which may be stored on a storage medium or communicated to the navigation device via a communications channel. Alternatively, the method may include a step of transmitting a message requesting one or more suggested destinations and receiving a response message indicating the one or more suggested destinations.

Preferably, the method further includes a step of displaying an indication of each of the suggested destinations for selection by a user. The suggested destinations may be organised under one or more categories. The suggested destinations may be organised according to an index value associated with each suggested destination, wherein the index value indicates an estimate of the destination's relevance to the user. The relevance may be based upon user preferences and/or information indicating types of destination previously selected by the user stored in a memory of the navigation device.

Yet another embodiment of the present invention relates to computer software comprising one or more software modules operable, when executed in an execution environment, to cause a processor to perform a method of providing one or more suggested destinations for selection by a user, comprising determining one or more suggested destinations from a plurality of suggestible destinations.

Another embodiment of the present invention relates to a method of determining one or more suggestible destinations, comprising: receiving journey information from a plurality of navigation devices, wherein the journey information indicates one or more journeys made by each of the navigation devices, and determining locations visited by users of those navigation devices.

Preferably, the method includes a step of determining each location visited by a plurality of users. Preferably, the method includes determining locations at which each navigation device remained for greater than a predetermined duration. The method may also include a step of determining which of those locations correspond to a location of interest, and which of those locations correspond to a location not of interest. Locations not of interest may include locations visited for functional reasons. Determining locations of interest may be based upon a database of points of interest and/or comparing those locations against a business directory.

Preferably, the method includes a step of determining times at which navigation device users visited those locations.

The method may include a step of receiving feedback from a user of a navigation device indicating a rating of a visited location.

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

Brief Description of the Drawings

Various aspects of the teachings of the present invention, and arrangements embodying those teachings, will hereafter be described by way of illustrative example
10 with reference to the accompanying drawings, in which:

Fig. 1 is a schematic illustration of a Global Positioning System (GPS);

Fig. 2 is a schematic illustration of electronic components arranged to provide a navigation device;

Fig. 3 is a schematic illustration of the manner in which a navigation device may
15 receive information over a wireless communication channel;

Figs. 4A and 4B are illustrative perspective views of a navigation device;

Fig. 5 is a schematic representation of the software employed by the navigation device;

Fig. 6 is an illustration of journey information received from two navigation
20 devices; and

Fig. 7 is an illustration of a method according to an embodiment of the invention;

Fig. 8 is an illustration of a method according to another embodiment of the invention;

Fig. 9 is an illustration of temporal information associated with example
25 destinations;

Fig. 10 is an illustration of map data containing a plurality of destinations and journeys made by navigation devices between those destinations;

Fig. 11 is an illustration of a suggestible destination database structure according to an embodiment of the invention; and

30 Figure 12 is an illustration GUI according to an embodiment of the invention.

Detailed Description of Preferred Embodiments

Preferred embodiments of the present invention will now be described with particular reference to a PND. It should be remembered, however, that the teachings of
35 the present invention are not limited to PNDs but are instead universally applicable to any type of processing device that is configured to execute navigation software so as to

provide route planning and navigation functionality. It follows therefore that in the context of the present application, a navigation device is intended to include (without limitation) any type of route planning and navigation device, irrespective of whether that device is embodied as a PND, a navigation device built into a vehicle, or indeed a
5 computing resource (such as a desktop or portable personal computer (PC), mobile telephone or portable digital assistant (PDA)) executing route planning and navigation software.

With the above provisos in mind, Fig. 1 illustrates an example view of Global Positioning System (GPS), usable by navigation devices. Such systems are known and
10 are used for a variety of purposes. In general, GPS is a satellite-radio based navigation system capable of determining continuous position, velocity, time, and in some instances direction information for an unlimited number of users. Formerly known as NAVSTAR, the GPS incorporates a plurality of satellites which orbit the earth in extremely precise orbits. Based on these precise orbits, GPS satellites can relay their location to any
15 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
20 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,
25 acquiring a fourth satellite signal will allow the receiving device to calculate its three dimensional position by the same geometrical calculation in a known manner. The position and velocity data can be updated in real time on a continuous basis by an unlimited number of users.

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

The spread spectrum signals 160, continuously transmitted from each satellite
35 120, utilize a highly accurate frequency standard accomplished with an extremely accurate atomic clock. Each satellite 120, as part of its data signal transmission 160,

transmits a data stream indicative of that particular satellite 120. It is appreciated by those skilled in the relevant art that the GPS receiver device 140 generally acquires spread spectrum GPS satellite signals 160 from at least three satellites 120 for the GPS receiver device 140 to calculate its two-dimensional position by triangulation. Acquisition
5 of an additional signal, resulting in signals 160 from a total of four satellites 120, permits the GPS receiver device 140 to calculate its three-dimensional position in a known manner.

Figure 2 is an illustrative representation of electronic components of a navigation device 200 according to a preferred embodiment of the present invention, in block
10 component format. It should be noted that the block diagram of the navigation device 200 is not inclusive of all components of the navigation device, but is only representative of many example components.

The navigation device 200 is located within a housing (not shown). The housing includes a processor 210 connected to an input device 220 and a display screen 240.
15 The input device 220 can include a keyboard device, voice input device, touch panel and/or any other known input device utilised to input information; and the display screen 240 can include any type of display screen such as an LCD display, for example. In a particularly preferred arrangement the input device 220 and display screen 240 are integrated into an integrated input and display device, including a touchpad or
20 touchscreen input so that a user need only touch a portion of the display screen 240 to select one of a plurality of display choices or to activate one of a plurality of virtual buttons.

The navigation device may include an output device 260, for example an audible output device (e.g. a loudspeaker). As output device 260 can produce audible
25 information for a user of the navigation device 200, it is should equally be understood that input device 240 can include a microphone and software for receiving input voice commands as well.

In the navigation device 200, processor 210 is operatively connected to and set to receive input information from input device 220 via a connection 225, and operatively
30 connected to at least one of display screen 240 and output device 260, via output connections 245, to output information thereto. Further, the processor 210 is operably coupled to a memory resource 230 via connection 235 and is further adapted to receive/send information from/to input/output (I/O) ports 270 via connection 275, wherein the I/O port 270 is connectible to an I/O device 280 external to the navigation device
35 200. The memory resource 230 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 280 may include, but is not limited to an external listening device such as an earpiece for example. The connection to I/O device 280 can further be a wired or wireless connection to any other external device such as a car stereo unit for hands-free operation and/or for voice activated operation for example, for connection to an ear piece or head phones, and/or for connection to a mobile phone for example, wherein the mobile phone connection may be used to establish a data connection between the navigation device 200 and the internet or any other network for example, and/or to establish a connection to a server via the internet or some other network for example.

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

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

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

Referring now to Fig. 3, the navigation device 200 may establish a "mobile" or telecommunications network connection with a server 302 via a mobile device (not shown) (such as a mobile phone, PDA, and/or any device with mobile phone technology) establishing a digital connection (such as a digital connection via known Bluetooth technology for example). Thereafter, through its network service provider, the mobile device can establish a network connection (through the internet for example) with a server 302. As such, a "mobile" network connection is established between the navigation device 200 (which can be, and often times is mobile as it travels alone and/or in a vehicle) and the server 302 to provide a "real-time" or at least very "up to date"

gateway for information.

The establishing of the network connection between the mobile device (via a service provider) and another device such as the server 302, using an internet (such as the World Wide Web) for example, can be done in a known manner. This can include
5 use of TCP/IP layered protocol for example. The mobile device can utilize any number of communication standards such as CDMA, GSM, WAN, etc.

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

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

The navigation device 200 may include its own mobile phone technology within
20 the navigation device 200 itself (including an antenna for example, or optionally using the internal antenna of the navigation device 200). The mobile phone technology within the navigation device 200 can include internal components as specified above, and/or can include an insertable card (e.g. Subscriber Identity Module or SIM card), complete with necessary mobile phone technology and/or an antenna for example. As such,
25 mobile phone technology within the navigation device 200 can similarly establish a network connection between the navigation device 200 and the server 302, via the internet for example, in a manner similar to that of any mobile device.

For GRPS phone settings, a Bluetooth enabled navigation device may be used to correctly work with the ever changing spectrum of mobile phone models, manufacturers,
30 etc., model/manufacture specific settings may be stored on the navigation device 200 for example. The data stored for this information can be updated.

In Fig. 3 the navigation device 200 is depicted as being in communication with the server 302 via a generic communications channel 318 that can be implemented by any of a number of different arrangements. The server 302 and a navigation device 200
35 can communicate when a connection via communications channel 318 is established between the server 302 and the navigation device 200 (noting that such a connection

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

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

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

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

Software stored in server memory 306 provides instructions for the processor 304 and allows the server 302 to provide services to the navigation device 200. One
30 service provided by the server 302 involves processing requests from the navigation device 200 and transmitting navigation data from the mass data storage 312 to the navigation device 200. Another service provided by the server 302 includes processing the navigation data using various algorithms for a desired application and sending the results of these calculations to the navigation device 200.

35 The communication channel 318 generically represents the propagating medium or path that connects the navigation device 200 and the server 302. Both the server 302

and navigation device 200 include a transmitter for transmitting data through the communication channel and a receiver for receiving data that has been transmitted through the communication channel.

5 The communication channel 318 is not limited to a particular communication technology. Additionally, the communication channel 318 is not limited to a single communication technology; that is, the channel 318 may include several communication links that use a variety of technology. For example, the communication channel 318 can be adapted to provide a path for electrical, optical, and/or electromagnetic communications, etc. As such, the communication channel 318 includes, but is not
10 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, empty space, etc. Furthermore, the communication channel 318 can include intermediate devices such as routers, repeaters, buffers, transmitters, and receivers, for example.

15 In one illustrative arrangement, the communication channel 318 includes telephone and computer networks. Furthermore, the communication channel 318 may be capable of accommodating wireless communication such as radio frequency, microwave frequency, infrared communication, etc. Additionally, the communication channel 318 can accommodate satellite communication.

20 The communication signals transmitted through the communication channel 318 include, but are not limited to, signals as may be required or desired for given communication technology. For example, the signals may be adapted to be used in cellular communication technology such as Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA), Code Division Multiple Access (CDMA),
25 Global System for Mobile Communications (GSM), etc. Both digital and analogue signals can be transmitted through the communication channel 318. These signals may be modulated, encrypted and/or compressed signals as may be desirable for the communication technology.

The server 302 includes a remote server accessible by the navigation device 200
30 via a wireless channel. The server 302 may include a network server located on a local area network (LAN), wide area network (WAN), virtual private network (VPN), etc.

The server 302 may include a personal computer such as a desktop or laptop computer, and the communication channel 318 may be a cable connected between the personal computer and the navigation device 200. Alternatively, a personal computer
35 may be connected between the navigation device 200 and the server 302 to establish an internet connection between the server 302 and the navigation device 200.

Alternatively, a mobile telephone or other handheld device may establish a wireless connection to the internet, for connecting the navigation device 200 to the server 302 via the internet.

5 The navigation device 200 may be provided with information from the server 302 via information downloads which may be periodically updated automatically or upon a user connecting navigation device 200 to the server 302 and/or may be more dynamic upon a more constant or frequent connection being made between the server 302 and navigation device 200 via a wireless mobile connection device and TCP/IP connection for example. For many dynamic calculations, the processor 304 in the server 302 may
10 be used to handle the bulk of the processing needs, however, processor 210 of navigation device 200 can also handle much processing and calculation, oftentimes independent of a connection to a server 302.

As indicated above in Fig. 2, a navigation device 200 includes a processor 210, an input device 220, and a display screen 240. The input device 220 and display screen
15 240 are integrated into an integrated input and display device to enable both input of information (via direct input, menu selection, etc.) and display of information through a touch panel screen, for example. Such a screen may be a touch input LCD screen, for example, as is well known to those of ordinary skill in the art. Further, the navigation device 200 can also include any additional input device 220 and/or any additional output
20 device 241, such as audio input/output devices for example.

Figs 4A and 4B are perspective views of a navigation device 200. As shown in Fig. 4A, the navigation device 200 may be a unit that includes an integrated input and display device 290 (a touch panel screen for example) and the other components of fig. 2 (including but not limited to internal GPS receiver 250, microprocessor 210, a power
25 supply, memory systems 230, etc.).

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

As shown in Fig. 4B, the navigation device 200 can be docked or otherwise
30 connected to an arm 292 of the docking station by snap connecting the navigation device 292 to the arm 292 for example. The navigation device 200 may then be rotatable on the arm 292, as shown by the arrow of Fig. 4B. To release the connection between the navigation device 200 and the docking station, a button on the navigation device 200 may be pressed, for example. Other equally suitable arrangements for
35 coupling and decoupling the navigation device to a docking station are well known to persons of ordinary skill in the art.

Referring now to Fig. 5 of the accompanying drawings, the memory resource 230 stores a boot loader program (not shown) that is executed by the processor 210 in order to load an operating system 470 from the memory resource 230 for execution by functional hardware components 460, which provides an environment in which application software 480 can run. The operating system 470 serves to control the functional hardware components 460 and resides between the application software 480 and the functional hardware components 460. The application software 480 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. In accordance with the preferred embodiment of the present invention, part of this functionality comprises a destination suggestion module 490, the function of which will now be described in detail in connection with the following figures.

An embodiment of the present invention provides a navigation device 200 having the destination suggestion module 490. The navigation device 200 is operable in a suggested destination mode to provide one or more suggested destinations to a user, based upon a current location of the navigation device 200, previous journeys made by navigation device 200 and previously visited destinations. In some embodiments, the destination suggestion module 490 suggests destinations based, at least in part, upon a current time of day. Furthermore, the suggested destinations may be based upon one or more of user preferences stored in the memory 230 of the navigation device 200; a category of a plurality of destinations available for suggestion; and/or a popularity of destinations, as will be explained.

In one embodiment, the navigation device 200 is arranged to receive one or more files comprising suggestible destination information from the server 302 via communications channel 318. For example, the navigation device 200 is arranged to periodically download a suggestible destinations database from the server 302. The suggestible destinations database may be downloaded on a daily, weekly or any other periodic basis. However, as it is expected that suggested destinations provided by the database will only slowly change, it is expected that a weekly, bi-weekly or monthly update period will be sufficient. Alternatively, the suggestible destinations database may be downloaded by the destination suggestion module 490 when the server 302 indicates that a new version is available to download. Once the suggestible destinations database is downloaded from the server 302 it is stored in the memory 230 of the navigation device 200 for use by the destination suggestion module 490. In another embodiment, the navigation device 200 may be provided with the suggestible destinations database

stored in a portable memory device, such as a memory card e.g. an SD-card. Portable memory devices containing the suggestible destinations database may be periodically distributed to owners of navigation devices, or may be sold with periodically updated destinations.

5 In another embodiment, the navigation device 200 is arranged to obtain information identifying one or more suggested destinations from the server 302 corresponding to information provided by the navigation device 200 via the communications channel 318. For example, the navigation device 200 may send a destination suggestion message to the server 302 requesting information identifying one
10 or more suggested destinations corresponding to a location of the navigation device 200 specified in the request message. The destination suggestion message may include further information, such as a category of destination. The server 302 is arranged to respond by sending a response message to the navigation device 200 comprising information identifying one or more suggested destinations.

15 As noted above, destinations suggested to the user are based, at least partly, on a current location of the navigation device. In one embodiment, suggested destinations are within a predetermined distance of the navigation device's current location. The predetermined distance may be set by a user. Alternatively, suggested destinations may be within a predetermined travelling time of the navigation device's current location.
20 Thus, suggested destinations may be reached in an acceptable time by the user from their current location taking into consideration a nature of roads and, in some embodiments, traffic/road conditions between the navigation device 200 and the suggested destination.

 Within that predetermined distance, a plurality of suggestible destinations may
25 exist. Of those, only a subset may be offered to the user by the destination suggestion module 490 as suggested destinations, or the plurality of destinations may be ordered, such that those determined by the destination suggestion module 490 to be more relevant to the user of the navigation device 200, are presented first. The choice or ordering of suggested destinations may be based upon a popularity of those destinations
30 with users of navigation devices 200 or previous visitors. The popularity may be indicated by rating information associated with each suggestible destination in the database, as will be explained.

 As will be described, suggested destinations are determined according to a number of previous visitors having navigation devices 200 or feedback information
35 provided via the navigation device 200. A number of previous visitors to a destination may be recorded by storing in the memory 230 of the navigation device 200 journey

information of the navigation device 200, wherein the journey information is information periodically recorded during one or more journeys in which navigation device 200 was operative. The journey information is communicated to the server 302 from the navigation device 200 and analysed, in combination with journey information of other navigation devices 200, to determine suggestible destinations as explained below. In some embodiments, after having visited a previously suggested destination, the destination suggestion module 490 may prompt the user to enter a rating for that destination. The destination rating may be communicated to the server 302 in a destination rating message and destination ratings for a destination from a plurality of users may be combined by the server 302 in order to determine suggestible destinations, or an order in which destinations are suggested to a user, by the destination suggestion module 490.

In one embodiment, destinations are suggested by the destination suggestion module 490 based upon a time at which other users of navigation devices 200 previously visited each destination. For example, if it is determined from journey information that a peak of users visited a destination between the hours of 11:30 and 14:00, then the destination suggestion module 490 may suggest that destination, or may more prominently suggest that destination, during those hours. This is advantageous in that, for example, if a destination is food/drink related, then the destination suggestion module 490 will suggest that destination during periods in which it is likely to be more relevant or likely to be accepted by a user of the navigation device 200. Similarly, in another embodiment, the destination suggestion module 490 is arranged to suggest destinations according to opening hours of suggestible destinations. The destination suggestion module 490 may store opening hour information and, based upon an estimated travelling time to a destination, may include or exclude that destination from suggestion. This avoids destinations being suggested which would not be open for visiting by a user having travelled to that destination.

Furthermore, in some embodiments, the destination suggestion module 490 is arranged to suggest destinations to provide a diverse range of destination types. Each suggestible destination may be associated with one or more of a plurality of categories, each denoting a type of the suggestible destination. For example, categories may be "nature reserve", "museum", "shopping centre", "art gallery", "nature site", although it will be realised that this is merely exemplary. In order to prevent all, or a majority of suggested destinations, being, for example, museums, some embodiments of the destination suggestion module 490 are arranged to select suggested destinations to ensure that a diverse range of destination categories exist in the suggested destinations.

The destination suggestion module 490 may suggest destinations according to a predetermined maximum number of suggested destinations per category. For example, a limit of two destinations may be suggested per category, such that there will always be a variety of destination types in a list of suggested destinations displayed on the display device 240.

Further, in some embodiments of the present invention, the destination suggestion module 490 is arranged to suggest destinations taking into account a type of current location. For example, if suggested destinations are requested by a user of a navigation device 200 located at a destination of type "cultural", then the destination suggestion module may reduce a number of suggested destinations of the same, "cultural", category.

In some embodiments, the memory 230 of the navigation device 200 comprises one or more files storing information on user preferences of a user of the navigation device 200, or one or more files storing history information recording categories of previously chosen destinations from amongst suggested destinations. The user preferences may indicate a user's preferred one or more categories of destinations. The destination suggestion module 490 is arranged to suggest destinations based upon one or both of the user preferences and/or history information. For example, if either indicates that the user prefers, or has previously selected, destinations of a type "shopping centre", suggested destinations may be chosen to include more of those category of destinations. In one embodiment, rather than providing a list of suggested destinations comprising two destinations per category type, the destination suggestion module 490 is arranged to suggest preferred categories of destinations using an increased destination limit of, for example, 4 destinations in each category.

In other embodiments, destinations may be suggested by the destination suggestion module 490 based upon a proximity of the suggested destinations to other suggestible destinations. For example, the destination suggestion module 490 may select a destination for suggestion based upon a number of other suggestible destinations within a predetermined distance or travelling time to that destination. Thus, a destination having a large number of other suggestible destinations within a predetermined distance or travelling time is selected for suggestion to a user in preference over another destination which has fewer or no suggestible destinations within the predetermined distance from that destination. This is advantageous in that once a user has visited a suggested destination a greater number of other destinations may be suggested to the user by the destination suggestion module 490.

The destination suggestion module 490 is arranged to suggest destinations to

the user by displaying an indication of a plurality of suggested destinations on the display device 240. The plurality of suggested destinations may be arranged in the form of a list on the display device 240. Suggested destinations may be given an index value by the destination suggestion module 490 based upon one or more factors as described above. Destinations having a greater index value may be given greater prominence, for example, displayed toward a head of the list, than other destinations given a lower index. Further, suggested destinations may be organised on the display device 240 under one or more categories or "headings", for example, "shopping centres", "museums", "country parks", etc. It will be realised that this list is not exhaustive. A user then selects a desired category and is then presented on the display device 240 with a list of suggested destinations within that category. Provision of suggested destinations to the user by the navigation device 200 may be performed in response to the user activating a suggested destination mode, for example, in response to a button press received by the navigation device 200.

Some embodiments of the present invention provide a server 302 which is arranged to determine destinations to suggest to users of navigation devices 200. The destinations are determined from historical data of users of devices able to determine their current location and reporting historical journey information to the server 302, such as the navigation device 200, but also vehicle security devices and road-toll payment devices and the like.

In embodiments of the invention, a navigation device 200 is arranged to store in the memory 230 journey information concerning journeys made by the navigation device 200. If the navigation device 200 is currently navigating a route between start and destination locations, then the journey information includes information identifying the start and destination locations. In addition, even if the user is operating the navigation device 200 in the "free driving" mode, the navigation device 200 periodically stores in the memory 230 information identifying the location of the navigation device 200 and time information identifying a time at which the navigation device 200 was at that location, so that routes followed by the navigation device 200 may be reconstructed. The journey information may further include other information related to the journey and/or current location, such as a velocity of the navigation device, direction, position dilution information etc. When the navigation device 200 is communicatively coupled with the server 302, the navigation device 200 transfers the stored journey information to the server 302. In some embodiments, if the navigation device 200 establishes a mobile connection to the server 302, for example via a mobile phone, then the journey information may be communicated to the server 302 in real time. Alternatively, if the

navigation device 200 is only periodically in communication with the server 302, then journey information for a plurality of journeys may be transferred to the server 302 at that time.

Once journey information from a plurality of navigation devices 200 is stored in a memory of the server 302, the server 302 is arranged to determine, from the journey information, locations visited by users for use as suggested destinations for other users. The determination may be made by a journey analysis module operative on the server 302. Figure 6 shows journey information for first 610 and second 620 users. The journey information indicates that, in a geographical area, the first user 610 visited locations 10, 3, 4, 6, 7, 5 and 1 in that order, whilst the second user visited locations 1, 2, 3, 9, 8, 7, 5 and 11 in order. A location where a user spent a period of time may be determined due to the existence of multiple samples in a relatively small area, visible as "knots" in each journey trace. Alternatively, when the journey information indicates that the navigation device 200 was turned off and on at that location more than a predetermined time apart may indicate that the user spent a period of time at that location.

Referring to Figure 7, a method of identifying locations for use as suggested destinations according to an embodiment of the invention is shown which starts with step 710. In step 720, locations at which two or more users spent more than a predetermined amount of time are identified from the journey information by the server 302.

In some embodiments, in order to determine locations of interest to users, information i.e. journey traces from a plurality of users are compared to determine locations at which more than one user spent more than a predetermined period of time. For example, the predetermined period of time may be more than 2 hours, although it will be realised that other durations may be used. Furthermore, more than a predetermined number of users may be required to have spent time at the location. As a result of this step, locations 1, 3, 5 and 7 are identified as possible locations for suggestion 630.

In order to improve a confidence in the possible locations 630, in step 730 the possible locations 630 are compared with a database containing points-of-interest (POI), such as the locations of tourist attractions including, for example, locations of museums, theme parks, country parks, shopping centres etc. and also locations of railway stations, airports, hotels, car parks etc. The purpose of this step is to identify any locations amongst the possible locations for suggestion 630 which are unlikely to have been visited for pleasure, such as a railway station, and to establish locations which are likely to have been visited for pleasure. For example, as a result of comparing the possible

locations 630 against the POI database, locations 1, 3 and 5 are determined to be tourist attractions and therefore a confidence of these locations being locations suitable for suggestion is increased. These locations are therefore stored in a set of suggestable locations comprising, in the illustrated example, locations 1, 3 and 5. However, other
5 locations, for example location 7, may not exist in the POI database.

In step 740 locations not removed from the set of possible locations for suggestion 630 or stored in the set of suggestable locations are compared against traffic information relating to a time at which the users spent time at those locations. For example, as a result of the comparison with historical traffic information, location 7 may
10 be identified as a traffic jam in which both the first and second users spent a period of time. Therefore, location 7 may be identified as a location unsuitable for suggestion to other users.

In step 750, the locations are compared against a database storing business information, such as information identifying business which may be visited for pleasure, such as cafés, restaurants, nightclubs etc. As a result of this process, locations 4 and 9
15 may be identified as business locations for suggestion 640 and included in the set of suggestable locations. The business directory may be an on-line source of business information. The method ends in step 760. It will be realised that various modifications may be made to the method described with reference to Figure 7, such as steps being
20 performed in a different order.

As a result of the above process, locations 1, 3, 4, 5 and 9 are stored in the set of suggestable locations. For each of the locations in the set of suggestable locations, further information may be stored corresponding to each location. The information may include information relating to a time at which each location was visited. For example,
25 locations 4 and 9 may have experienced most visits between the hours of 11:30-14:00. Therefore, time information identifying these visiting hours may be stored accompanying these locations. In another embodiment, each location may be stored with a pointer to a next visited location if such a correlation exists in the journey information. For example, users having visited the tourist attraction at location 3 may often subsequently visit cafés
30 at locations 4 and 9. Therefore, information stored with location 3 may contain pointers to locations 4 and 9.

As a result of the above process, the server 302 identifies a plurality of locations as suggestible destinations and these may be stored in one or more files in memory 306 of the server 302 as the suggestible destinations database. The server 302 may then
35 communicate the suggestible destinations database to navigation devices 200, as described above. However, as noted above, in some embodiments, the server 302 may

receive a destination suggestion message from a navigation device 200 requesting one or more suggested destinations.

The one or more suggested destinations may be determined by the server 302 using the functionality described above with reference to the destination suggestion module 490 of the navigation device 200. However, in addition, in some embodiments of the invention, the server 302 is arranged to suggest destinations to a plurality of navigation devices 200, for example over a predetermined duration, wherein the suggested destinations are distributed across a plurality of destinations. For example, considering a situation in which a plurality of navigation device 200 users are located in a geographical area and that those plurality of users all request suggested destinations from the server 302 during a time period of a few hours. Since the plurality of users are in the same geographical area, hence closely located, and suggestion requests are made in a relatively short period of time, the server 302 may suggest the same one or more destinations to all of the plurality of navigation devices. In order to avoid this, in an embodiment of the invention, the server 302 distributes the suggested destinations across a plurality of destinations in order to avoid all users travelling to and visiting the same destination. The distribution may take into account a capacity of each destination. For example, if one suggestible destination is a large tourist attraction, such as a shopping centre, then a visitor capacity of that location may be large and little distribution of the suggested destinations by the server 302 may be required. However, if suggestible destination is a monastery or the like having a relatively low visitor capacity, then the server 302 may only suggest that destinations to some of the plurality of navigation devices 200 to avoid congestion at that location.

A method 800 of determining suggestible destinations according to another embodiment of the invention will now be explained with reference to Figure 8.

In step 810 journey information from a plurality of navigation devices 200 is received. In step 820 the journey information is analysed by the server 302 to determine locations for use as suggested destinations. Step 820 may be comprise performing the method explained with reference to Figure 7. As a result of step 820, a plurality of locations is identified as locations for suggestion i.e. suggestible locations. In step 830, temporal information associated with each visit to each location in the journey information is analysed by the server 302 to determine one or more periods of time during which each location is visited. In step 840 visit sequence information is determined, as will be explained with reference to Figure 10. In step 850 the determined information is stored in a suggestible destinations database which identifies suggestible destinations for users of navigation devices. The structure of the suggestible

destinations database according to an embodiment of the invention is explained with reference to Figure 11. As previously explained, the database of suggestible destinations may be communicated to one or more navigation devices e.g. on a storage medium or downloaded from the server 302 to the navigation devices 200. Alternatively, the database is stored to be accessible by the server 302 in response to destination suggestion messages received from one or more navigation devices 200.

Figure 9 illustrates the temporal information associated with visits to three locations at which it has been determined exist a café, a theme park and a nightclub as shown in Figures 9(a), (b) and (c) respectively. The temporal information is determined by embodiments of the invention in step 830 by determining, from the journey information received in step 810, times at which navigation device 200 users visit each location. The times may be determined by the server 302 allocating a duration at which each navigation device 200 was present at each location to one or more of a plurality of predetermined time periods. It can be seen from Figure 9 that time periods of two hours over a twenty four hour period have been considered, although it will be realised that other time periods may be utilised. As will be appreciated from Figure 9(a) visits to the café predominantly occur entirely between the hours of 6-18hrs, therefore the server 302 is able to determine that this location is only suitable for suggestion between these hours. Furthermore, the server 302 determines that there exist two peak periods between 6-8hrs and 10-14hrs. Therefore, the information associated with the location of the cafe in the suggestible destinations database is arranged to indicate that this location should have a high probability of suggestion between these times. Similarly, for the theme park shown in Figure 9(b) the temporal information of the journey information indicates that visitors to the theme park are confined to the period 8-20hrs and that during this period of time the number of visitors is generally flat i.e. that visitors arrive in the morning remain for a majority of the day. However, as can be appreciated from Figure 9(c), for a nightclub some visitors arrive in the period between 20-22hrs, although a majority of visitors arrive between 22-24hrs and stay until between 2-4hrs. Therefore, the suggestible destinations database contains information reflecting these temporal distributions.

Figure 10 illustrates a geographical area 900 which contains five locations A-E identified in step 820 of the method explained with reference to Figure 8 to be suggestible destinations. Step 840 according to an embodiment of the invention will now be explained with reference to Figure 10. Based on the journey information received in step 810, the server 302 is arranged to determine that, in general, navigation device 200 users visited locations B, C and D before visiting location A. The server 302 determines

the order in which the navigation devices 200 travelled to each of locations B, C, D and then visited location A from temporal information included in the received journey information. Arrows 910, 920, 930 shown in Figure 9 indicate a number of navigation devices 200 which travelled from locations B, C, D to location A wherein a relative size of each arrow 910, 920, 930 indicates a number of navigation devices 200 making that journey during a time period considered. Arrow 940 indicates that, following visiting location A, a large number of navigation devices 200 then travelled to location E. It will be noted that not all journeys involving locations A-E are indicated in Figure 9 i.e. some navigation device 200 users may not have travelled to location E following visiting location A and that Figure 9 merely illustrates journeys made by significant numbers of navigation device 200 users. Following visiting location E, arrows 950, 960, 970 illustrate that navigation device 200 users head in a variety of different directions i.e. that there does not appear to be a particular destination which a number of navigation device users visit following location E. It can be appreciated from Figure 9 that, by determining whether more than a predetermined number of navigation devices 200 make journeys between sequential locations, visit sequence information indicating a sequence of locations visited by users of navigation devices 200 may be determined.

An embodiment of the suggestible destinations database 1000 is illustrated in Figure 11. The suggestible destinations database 1000 contains identification information 1010 for each suggestible destination. The identification information 1010 may identify a geographical location of each suggestible destination, such that a distance between a navigation device's current location and that of the suggestible destination may be determined. Furthermore, the identification information may also contain name information for each suggestible destination. The name information may be used to display an entry for the suggestible destination in a list of suggestible destinations displayed on the display device 240 of the navigation device 200. The database 1000 includes destination type information 1020 which may indicate that each destination is one or more of a plurality of predetermined categories of destination type, as described above. For example, as shown in Figure 11, the destinations A-E in Figure 10 are indicated as being types: shopping, food/beverage, leisure, food/beverage and shopping, respectively. However, it will be realised that this example is merely illustrative and that other types of destinations may be selected. Time information 1030 may also be associated with each suggestible destination which indicates times at which the destination is visitable, or is popularly visited. The time information 1030 may be derived from received journey information, as described above, or based upon publicly available opening time information. The time information 1030 may be used to

determine whether to suggest each destination according to an expected arrival time at the destination from the navigation device's current location. For example, if the journey time between the navigation device's current location and the suggestible destination is outside of the period indicated by the time information, the destination may not be determined to be suitable for suggestion by the destination suggestion module 490. In some embodiments, the suggestible destinations database 1000 includes next destination information 1040 indicating one or more possible next or sequential destinations which may be suggested to a user at the current suggestible destination's location. The next destination information 1040 may be determined as previously explained with reference to Figure 10. In some embodiments, although not shown in Figure 11, the suggestible destination database 1000 may further include user rating information which indicates, for example, an average rating of each destination based upon responses of users rating that destination. The rating information may be used to rank a plurality of suggestible destination, such that destinations with a higher ranking are presented to a user first by a navigation device 200.

Figure 12 illustrates an example graphical user interface (GUI) 1200 according to an embodiment of the invention provided on the display device 240 by the destination suggestion module 490. The GUI 1200 comprises a main menu 1210 and a navigation menu 1210 from which is selectable a menu 1230 including a graphical icon in the form of a button labelled as "Suggested Destination" which, when activated by the user, causes the display of a suggested destination menu 1240 containing a plurality of graphical buttons each providing an option for the display of suggested destinations. Destinations may be suggested by activation of each of the buttons which are near to a current location of the navigation device 200, in a city selected by the user, near a home location stored in the navigation device 200, along a route determined by the navigation device 200, near a destination location selected by the user or which other navigation device users have chose to visit, respectively. Upon selection of one of the graphical buttons, the user is presented with a category menu 1250 providing a choice of categories of suggested destination. For example, as shown in Figure 12, graphical buttons corresponding to available categories of hot now, food, entertainment, interesting POIs, Day Long and More! are displayed. Hot now selects those destinations where a large number of visitors are expected to be at the current time and day long selects those destinations where users generally spend an entire day. Upon selecting a category of destination from the category menu 1250, the destination suggestion module 490 causes the display on the display device 240 of a suggested destinations menu 1260 containing a predetermined number of suggested destinations which may be

selected by a user. In some embodiments, as shown in Figure 12, the suggested destinations menu 1260 includes information indicating a distance from the current location of the navigation device 200 to each suggested destination, a name of each destination and rating information indicating a rating of each destination by previous visitors, although it will be realised that the suggested destination menu 1260 may, in some embodiments, not contain all of the information shown in Figure 12. If the user selects a destination from amongst the suggested destinations 1260, route guidance to the destination is provided by the navigation device 200. Following a visit to a selected destination i.e. when the navigation device 200 is turned on after a period of time at the selected location, a rating option 1270 may be displayed by the destination suggestion module 1270 which provides an option for the user to rate the visited destination, as shown in rating menu 1280. Rating information may be communicated to the server 302 for inclusion in the suggestible destinations database.

It will be apparent from the foregoing that the teachings of the present invention provide an arrangement whereby one or more destinations may be suggested to a user of a navigation device 200 based upon the current location of the navigation device 200 and journeys made by other navigation device users. In this way, destinations may be appropriately suggested to navigation device users with respect to previous visitors to those destinations.

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.

For example, whilst embodiments described in the foregoing detailed description refer to GPS, it should be noted that the navigation device may utilise any kind of position sensing technology as an alternative to (or indeed in addition to) GPS. For example the navigation device 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.

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

5 whether or not that particular combination has been specifically enumerated.

Claims

1. A navigation device (200), characterised by comprising a destination suggestion module (490) arranged to determine one or more suggested destinations from a plurality
5 of suggestible destinations, wherein the suggestible destinations have been determined from journey information obtained from a plurality of navigation devices (200).
2. The navigation device according to claim 1, wherein the suggested destinations are determined based upon a current location of the navigation device (200).
- 10 3. The navigation device of claim 1 or 2, wherein the suggestible destinations have been determined from the journey information as locations where at least some of the plurality of navigation devices (200) remained for more than a predetermined period of time.
- 15 4. The navigation device of claim 1, 2 or 3, wherein the destination suggestion module (490) is arranged to determine the one or more suggested destinations based category information associated with each of the suggestible destinations, and/or temporal information associated with each suggestible destination.
- 20 5. The navigation device (200) of claim 5, wherein the temporal information indicates one or more periods of time during navigation devices (200) previously remained at each location.
- 25 6. The navigation device of any preceding claim, comprising a memory (280) storing a suggestible destinations database (1000) containing the suggestible destinations, wherein the destination suggestion module (490) determines the suggested destinations from the suggestible destinations database (1000).
- 30 7. The navigation device (200) of any of claims 1 to 4, wherein the destination suggestion module (490) is arranged to transmit a message to a server (302) having access to a suggestible destinations database (1000) containing the suggestible destinations, wherein the message requests one or more suggested destinations and to receive a response message indicating the one or more suggested destinations.
- 35 8. A method of providing one or more suggested destinations for selection by a

user, comprising:

determining a current location of a navigation device (200);

5 characterised by:

determining, according to the location of the navigation device (200), one or more suggested destinations from a plurality of suggestible destinations, wherein the plurality of suggestible destinations has been determined from journey information obtained from
10 a plurality of navigation devices (200).

9. The method of claim 8, comprising:

receiving journey information from each of the plurality of navigation devices
15 (200), wherein the journey information is indicative of one or more journeys made by the respective navigation device (200); and

determining each of the plurality of suggestible destinations as a location where one or more navigation devices remained for more than a predetermined period of time.
20

10. The method of claim 8 or 9, comprising determining one or more periods of time during which the plurality of navigation devices (200) remained at each location, wherein the determining of the one or more suggested destinations includes determining whether an expected time of arrival at each suggestible destination is within one of the periods of
25 time.

11. The method of claim 9 or 10, comprising comparing each location where the plurality of navigation devices (200) remained for more than the predetermined period of time against one or both of a business directory and/or traffic information.
30

12. The method of any of claims 7 to 10, comprising displaying on a display device (240) information associated with each suggested destination for selection by a user.

13. The method of any of claims 7 to 12, wherein each suggestible destination is
35 associated with a category, and a plurality of suggested destinations are determined by selecting a predetermined number of suggestible destinations associated with each of a

predetermined number of categories.

14. A system, comprising:

5 a plurality of navigation devices (200); and

a server (302) communicably coupleable to each of the plurality of navigation devices (200);

10 characterised in that:

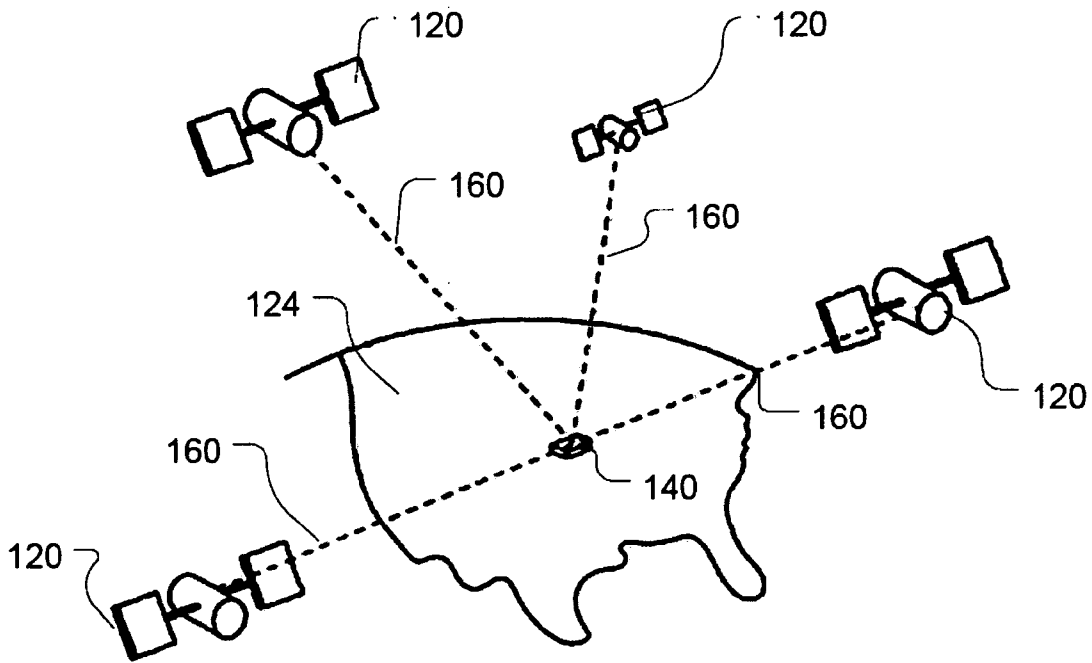
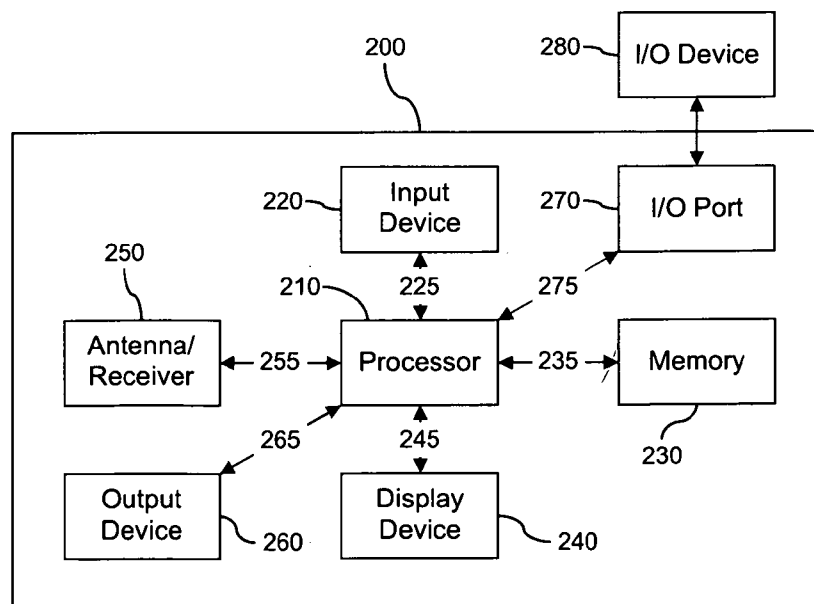
the server (302) is arranged to receive journey information from each of the plurality of navigation devices (200), the journey information indicative of one or more journeys made by each navigation device (200), and to determine, with respect to the
15 journey information, one or more suggestible destinations where more than a plurality of navigation devices (200) remained for at least a predetermined period of time; and

at least one of the navigation devices (200) is arranged to determine one or more suggested destinations selected from the suggestible destinations based upon a current
20 location of the navigation device (200).

15. The system of claim 14, wherein the server (302) is arranged to visit sequence information indicative of an order in which each of a plurality of navigation devices (200) visited each suggestible destination.

25

1/13

**FIG. 1****FIG. 2**

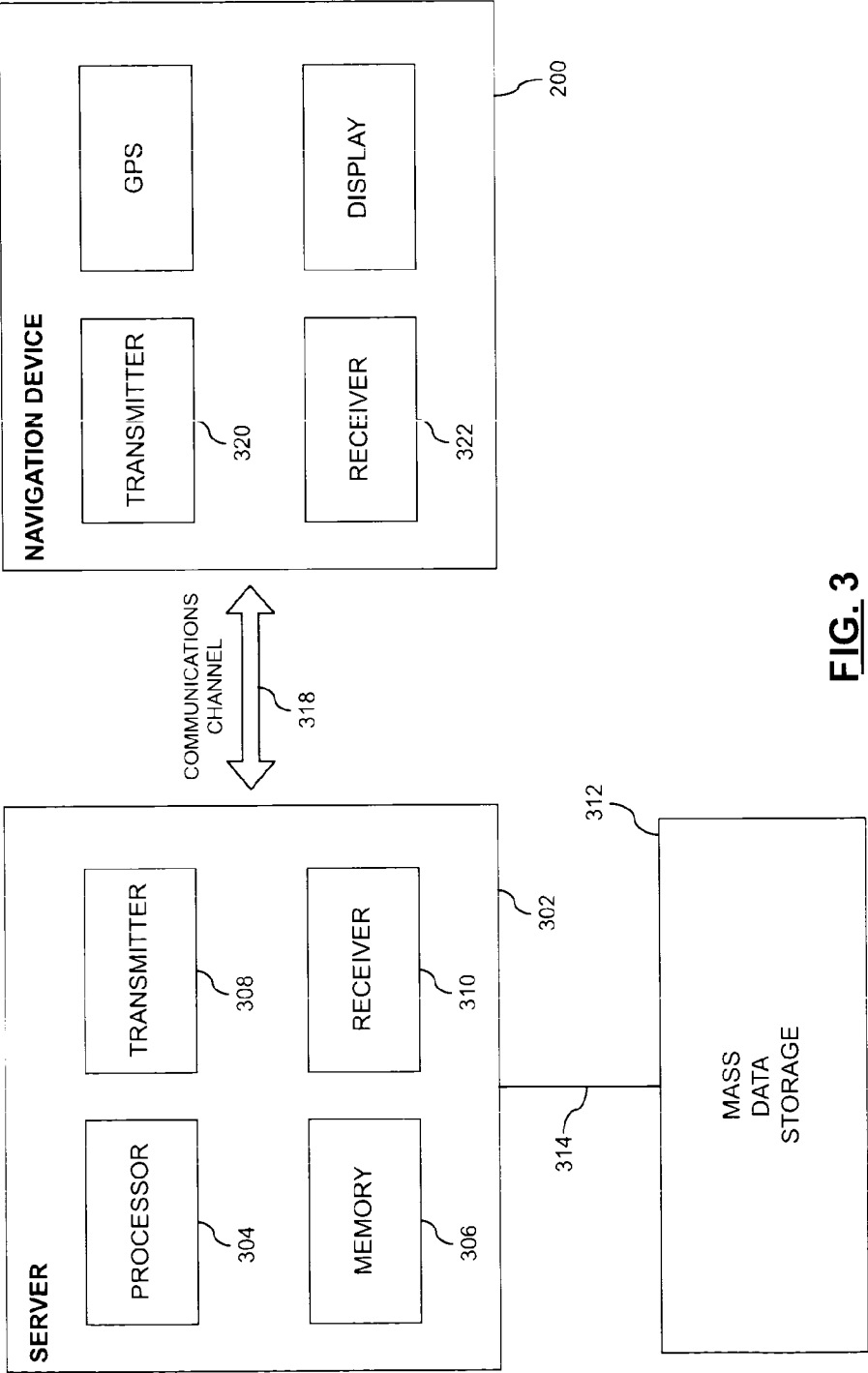


FIG. 3

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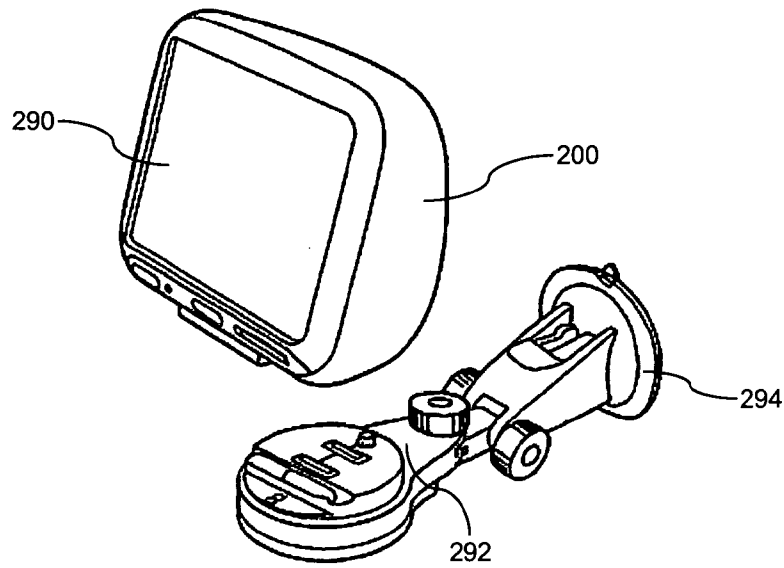


FIG. 4a

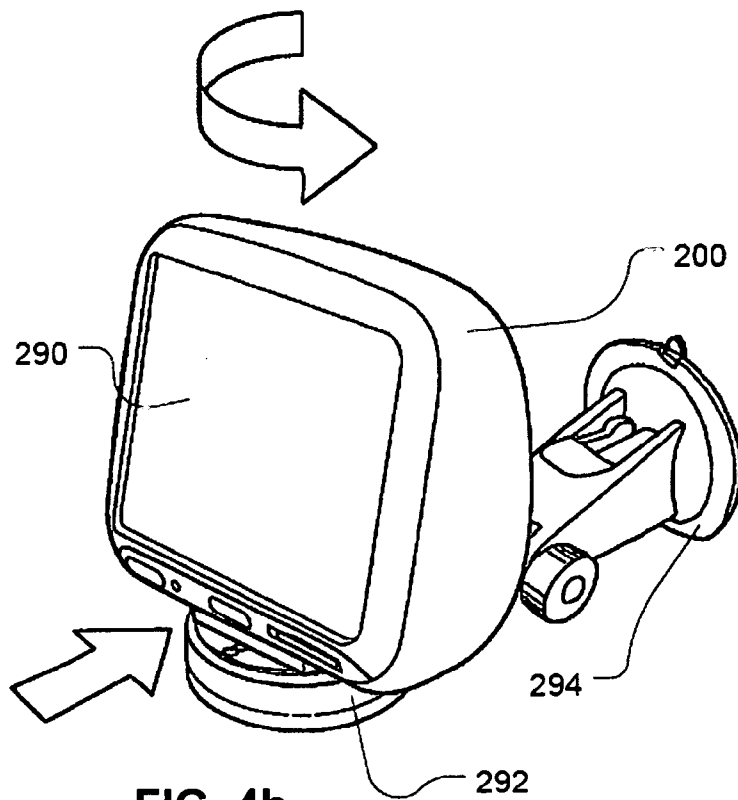
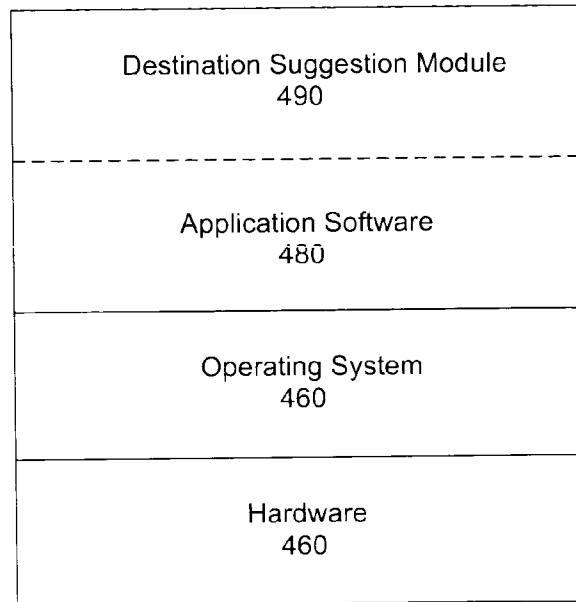


FIG. 4b

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**FIG. 5**

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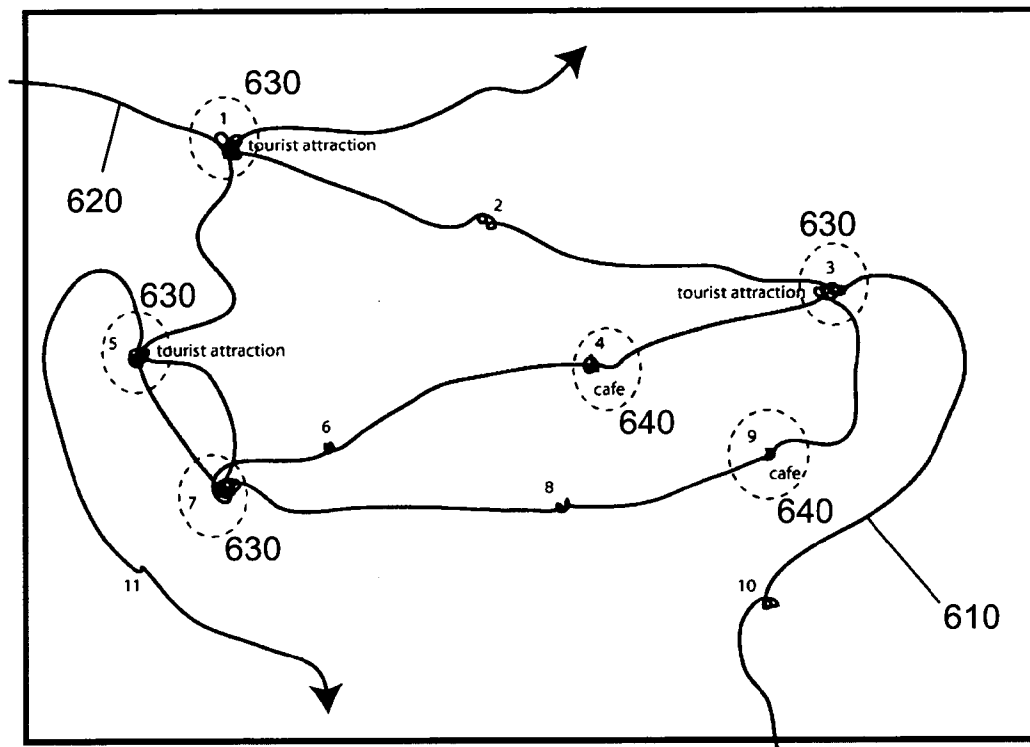
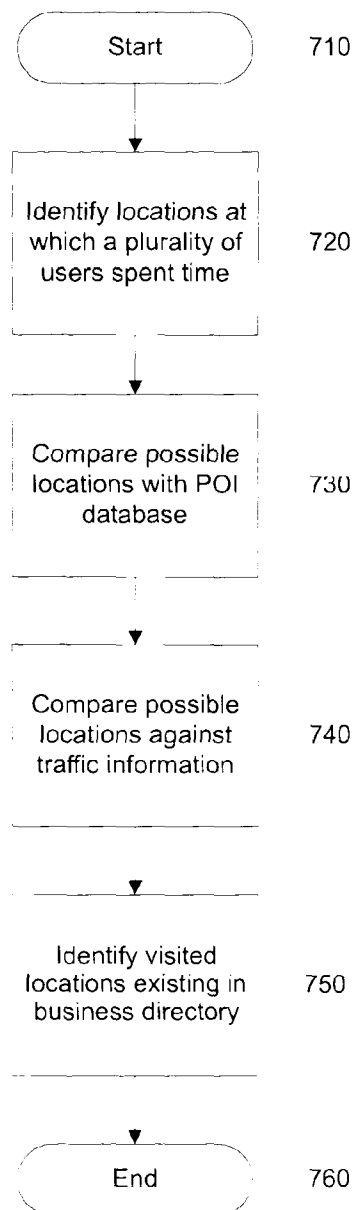
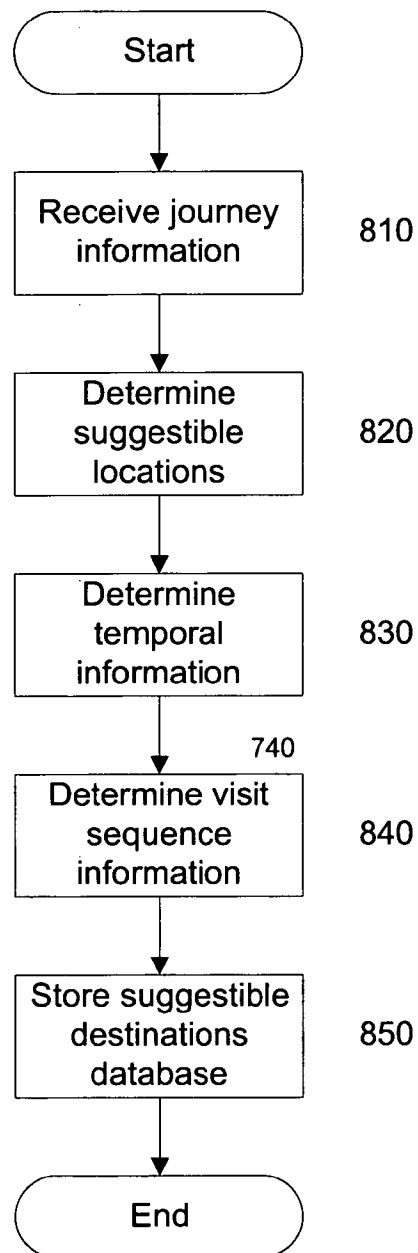


FIG. 6

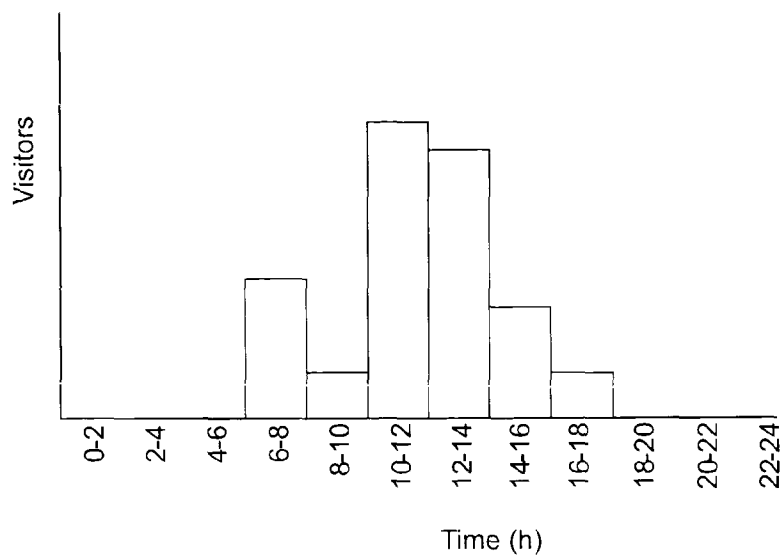
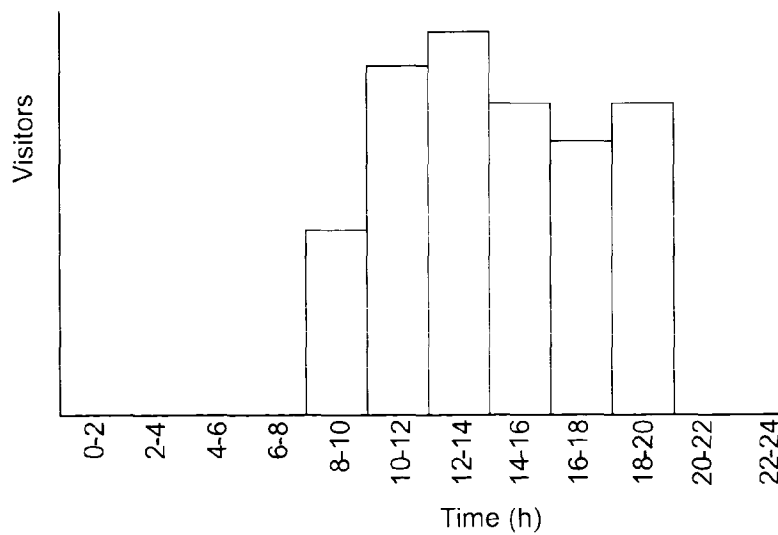
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**FIG. 7**

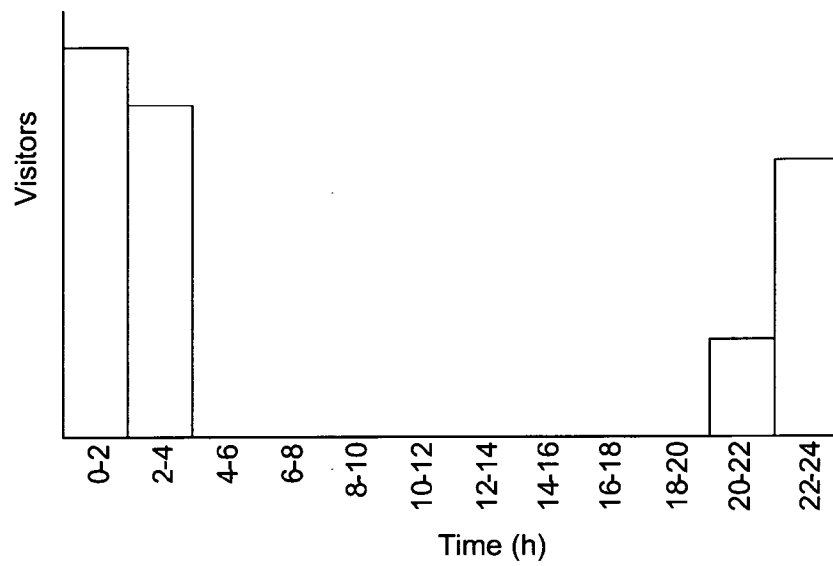
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**FIG. 8**

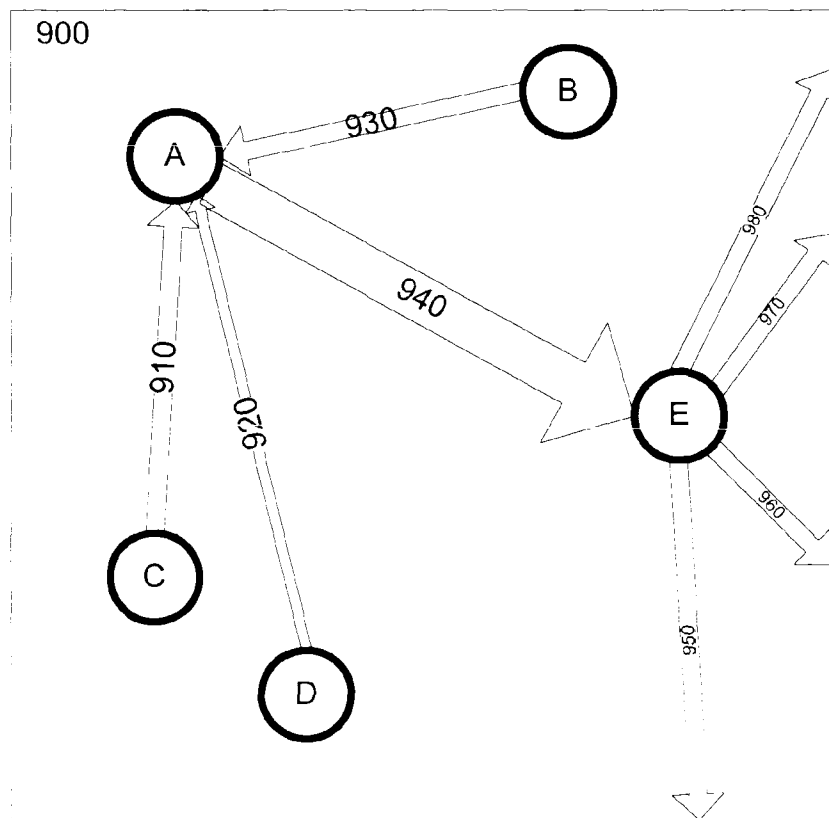
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**FIG. 9(a)****FIG. 9(b)**

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**FIG. 9(c)**

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**FIG. 10**

1010 Suggestible Location	1020 Destination Type	1030 Time Information	1040 Next Destination
A	Shopping	0900-1800	E
B	Food/Beverage	0800-1300	A
C	Leisure	0700-1000	A
D	Food/Beverage	0830-1700	A
E		0900-2000	

1000

FIG. 11

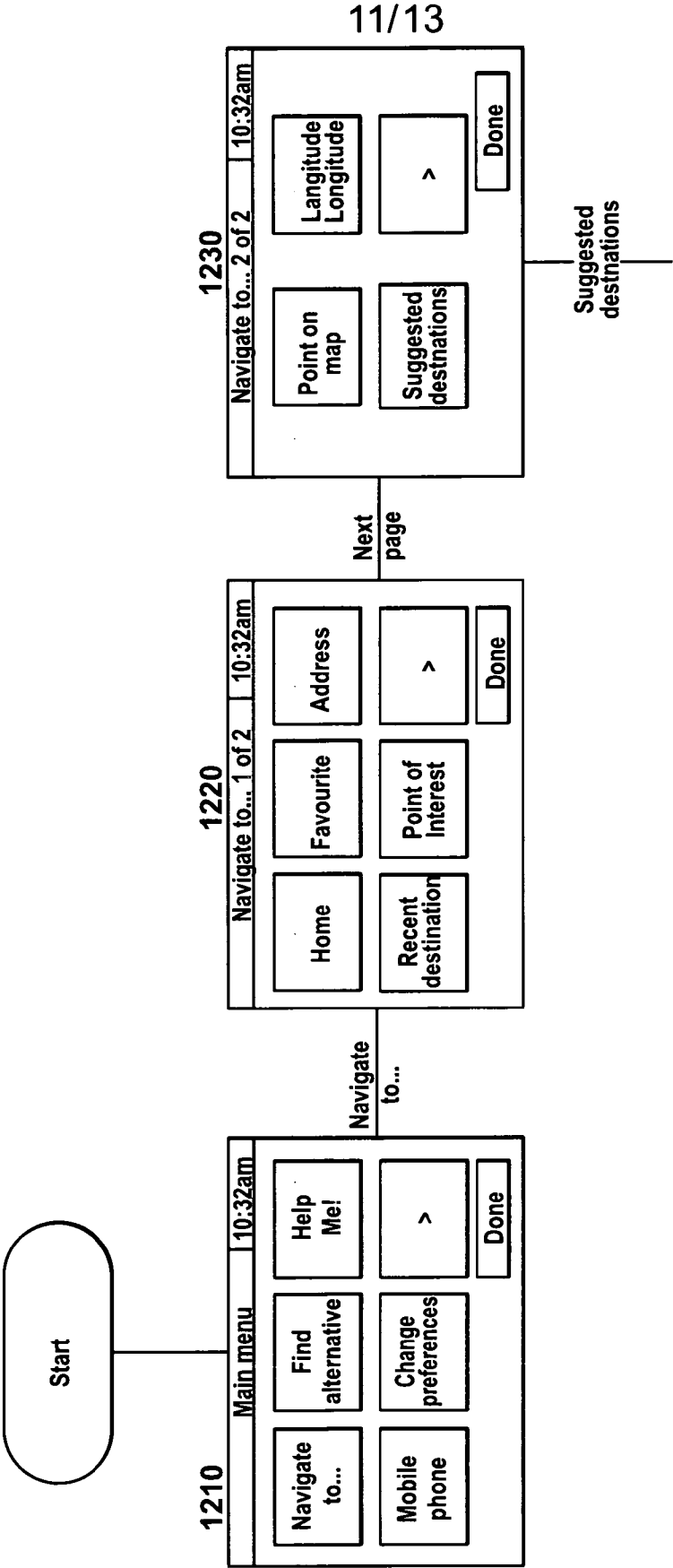


Fig. 12

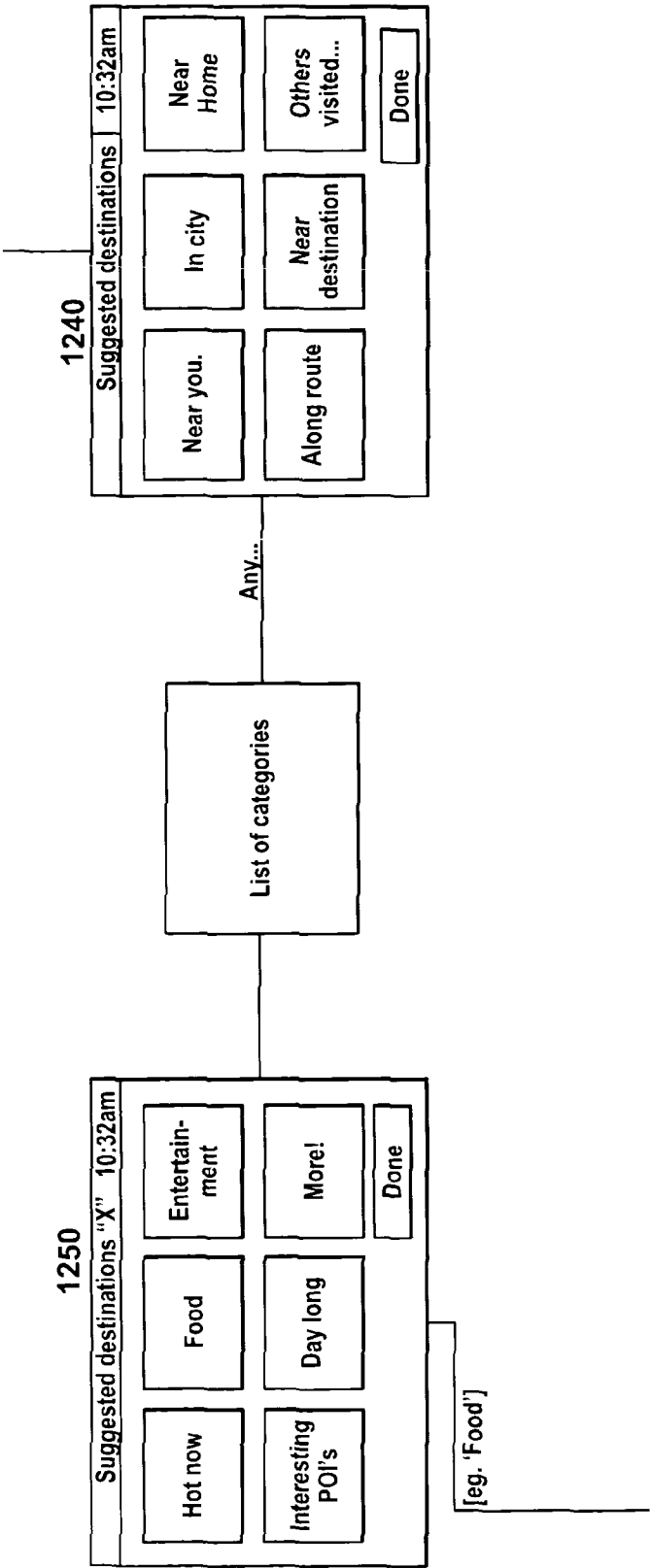


Fig. 12 Continued

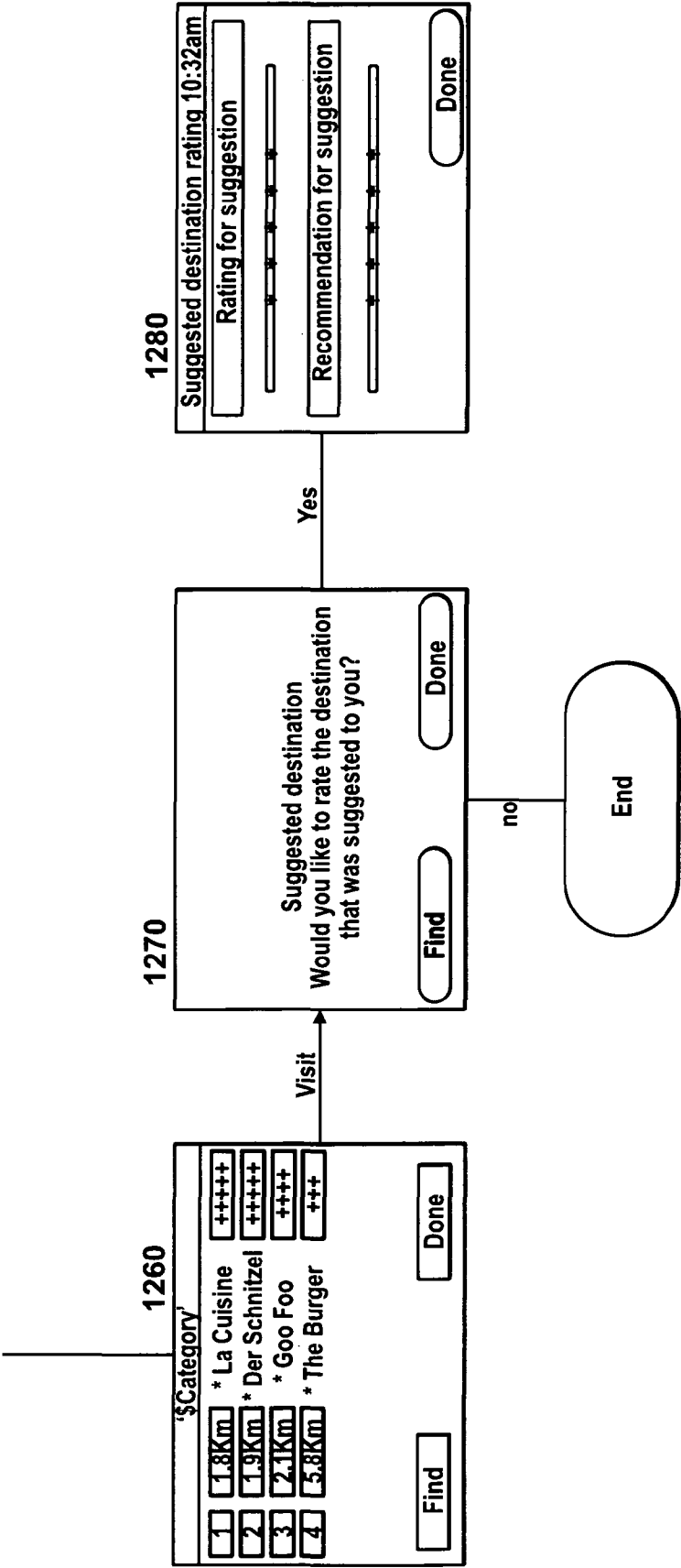


Fig. 12 Continued

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2009/066607

A. CLASSIFICATION OF SUBJECT MATTER

INV. G01C21/26 G08G1/0968 G08G1/0967 G01C21/34
ADD.

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 G08G

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, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/073477 A1 (KRUMM JOHN C [US] ET AL) 29 March 2007 (2007-03-29) paragraphs [0005] - [0015] - paragraphs [0029] - [0031] paragraphs [0034] - [0037] - paragraphs [0056] - [0060] the whole document	1-15
X	US 2007/010942 A1 (BILL DAVID S [US]) 11 January 2007 (2007-01-11) paragraphs [0005] - [0015] - paragraphs [0101] - [0107] paragraphs [0153] - [0194] the whole document	1-15
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
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INTERNATIONAL SEARCH REPORT

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PCT/EP2009/066607

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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International application No

PCT/EP2009/066607

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