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

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **GEELEN, Pieter** [NL/NL]; Rembrandtplein 35, NL-1017 CT Amsterdam (NL).

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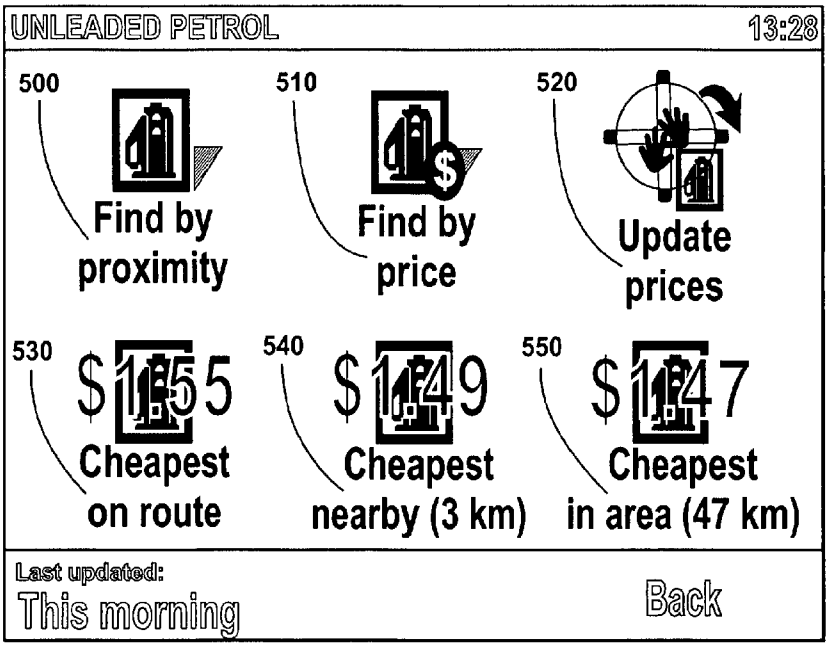
(54) Title: A NAVIGATION DEVICE AND METHOD FOR FUEL PRICING DISPLAY



(57) Abstract: A method and device are disclosed for navigation. In at least one embodiment, the method includes determining a designated fuel type; and displaying selectable fuel pricing information on a display of a navigation device, based upon the designated fuel type and in consideration of a location of the navigation device. In at least one embodiment, the navigation device includes a processor to determine a designated fuel type; and an integrated input and display device to display selectable fuel pricing information based upon the designated fuel type and in consideration of a location of the navigation device.

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A NAVIGATION DEVICE AND METHOD FOR FUEL PRICING DISPLAY

Field

The present application generally relates to navigation methods and devices.

Background

Navigation devices were traditionally utilized mainly in the areas of vehicle use, such as on cars, motorcycles, trucks, boats, etc. Alternatively, if such navigation devices were portable, they were further transferable between vehicles and/or useable outside the vehicle, for foot travel for example.
These devices are typically tailored to produce a route of travel based upon an initial position of the navigation device and a selected/input travel destination (end position), noting that the initial position could be entered into the device, but is traditionally calculated via GPS Positioning from a GPS receiver within the navigation device.
In known navigation systems, menus are used to display various travel destinations, desired locations, and desired points of interest. A user, for example, can select a category of restaurants as a point of interest, and can find a plurality of selections available. The user can then select a particular restaurant and then determine a route to that restaurant using the navigation system.

SUMMARY

The inventors discovered that although a plurality of selectable points of interest were displayed in known navigation systems, listing a plurality of entries for example in various selectable categories, only limited information was conveyed to the user, especially initially. The inventors developed a system regarding points of interest, and especially fuel stations, to convey information to the user in an efficient manner so that the user can make an informed choice.

In at least one embodiment of the present application, a method includes determining a designated fuel type; and displaying selectable fuel pricing information on a display of a navigation device, based upon the designated fuel type and in consideration of a location of the navigation device.

In at least one embodiment of the present application, a navigation device includes a processor to determine a designated fuel type; and an integrated input and display device to display selectable fuel pricing information based upon the designated fuel type and in consideration of a location of the navigation device.

In at least one embodiment of the present application, a method includes displaying an icon for updating fuel pricing information; updating, upon receipt of an indication of selection of the icon for updating pricing information, fuel pricing information; and displaying a plurality of selectable icons, useable to access the updated selectable fuel pricing information in consideration of a location of the navigation device, on a display of a navigation device.

In at least one other embodiment of the present application, a navigation device includes an integrated input and display device to display an icon for updating fuel pricing information; and a processor to update, upon receipt of an indication of selection of the icon for updating pricing information, fuel pricing information, the integrated input and display device being useable to display a plurality of selectable icons, useable to access the updated selectable fuel pricing information in consideration of a location of the navigation device.

BRIEF DESCRIPTION OF THE DRAWINGS

The present application will be described in more detail below by using example embodiments, which will be explained with the aid of the drawings, in which:

Figure 1 illustrates an example view of a Global Positioning System (GPS);

Figure 2 illustrates an example block diagram of electronic components of a navigation device of an embodiment of the present application;

Figure 3 illustrates an example block diagram of a server, navigation device and connection therebetween of an embodiment of the present application;

Figures 4A and 4B are perspective views of an implementation of an embodiment of the navigation device 200.

Figure 5A illustrates an example of an embodiment of the present application;
Figure 5B illustrates an example of a modified embodiment of the present application;
Figure 6 illustrates a screen display of selectable icons of an embodiment of the present application;
Figure 7 illustrates an example of a display screen for fuel type of an embodiment of the present application;
Figure 8 illustrates an example of a display screen for downloading fuel pricing information of an embodiment of the present application;
Figure 9 illustrates an example of a display screen for fuel pricing of an embodiment of the present application;
Figure 10 illustrates a screen display of selectable icons of an embodiment of the present application;
Figure 11 illustrates an example of another embodiment of the present application; and
Figure 12 illustrates an example of another embodiment of the present application.

DETAILED DESCRIPTION OF THE EXAMPLE EMBODIMENTS

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the present invention. As used herein, the singular forms "a", "an", and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "includes" and/or "including", when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.
In describing example embodiments illustrated in the drawings, specific terminology is employed for the sake of clarity. However, the disclosure of this patent specification is not intended to be limited to the specific terminology so selected and it is to be understood that each specific element includes all technical equivalents that operate in a similar manner.

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

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

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

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

shown receiving spread spectrum GPS satellite signals 160 from the various satellites 120.

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

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

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

In addition, other types of output devices 250 can also include, including but not limited to, an audible output device. As output device 250 can produce audible information to a user of the navigation device 200, it is equally

understood that input device 240 can also include a microphone and software for receiving input voice commands as well.

In the navigation device 200, processor 210 is operatively connected to and set to receive input information from input device 240 via a connection 225, and operatively connected to at least one of display screen 240 and output device 250, via output connections 245, to output information thereto. Further, the processor 210 is operatively connected to memory 230 via connection 235 and is further adapted to receive/send information from/to input/output (I/O) ports 270 via connection 275, wherein the I/O port 270 is connectible to an I/O device 280 external to the navigation device 200. The external I/O device 270 may include, but is not limited to an external listening device such as an earpiece for example. The connection to I/O device 280 can further be a wired or wireless connection to any other external device such as a car stereo unit for hands-free operation and/or for voice activated operation for example, for connection to an ear piece or head phones, and/or for connection to a mobile phone for example, wherein the mobile phone connection may be used to establish a data connection between the navigation device 200 and the internet or any other network for example, and/or to establish a connection to a server via the internet or some other network for example.

The navigation device 200, in at least one embodiment, may establish a "mobile" network connection with the server 302 via a mobile device 400 (such as a mobile phone, PDA, and/or any device with mobile phone technology) establishing a digital connection (such as a digital connection via known Bluetooth technology for example). Thereafter, through its network service provider, the mobile device 400 can establish a network connection (through the internet for example) with a server 302. As such, a "mobile" network connection is established between the navigation device 200 (which can be, and often times is mobile as it travels alone and/or in a vehicle) and the server 302 to provide a "real-time" or at least very "up to date" gateway for information. The establishing of the network connection between the mobile device 400 (via a service provider) and another device such as the server 302, using the internet 410 for example, can be done in a known manner. This can include use of

TCP/IP layered protocol for example. The mobile device 400 can utilize any number of communication standards such as CDMA, GSM, WAN, etc.
As such, an internet connection may be utilized which is achieved via data connection, via a mobile phone or mobile phone technology within the navigation device 200 for example. For this connection, an internet connection between the server 302 and the navigation device 200 is established. This can be done, for example, through a mobile phone or other mobile device and a GPRS (General Packet Radio Service)-connection (GPRS connection is a high-speed data connection for mobile devices provided by telecom operators; GPRS is a method to connect to the internet.
The navigation device 200 can further complete a data connection with the mobile device 400, and eventually with the internet 410 and server 302, via existing Bluetooth technology for example, in a known manner, wherein the data protocol can utilize any number of standards, such as the GSRM, the Data Protocol Standard for the GSM standard, for example.
The navigation device 200 may include its own mobile phone technology within the navigation device 200 itself (including an antenna for example, wherein the internal antenna of the navigation device 200 can further alternatively be used). The mobile phone technology within the navigation device 200 can include internal components as specified above, and/or can include an insertable card, complete with necessary mobile phone technology and/or an antenna for example. As such, mobile phone technology within the navigation device 200 can similarly establish a network connection between the navigation device 200 and the server 302, via the internet 410 for example, in a manner similar to that of any mobile device 400.
For GRPS phone settings, the Bluetooth enabled device may be used to correctly work with the ever changing spectrum of mobile phone models, manufacturers, etc., model/manufacturer specific settings may be stored on the navigation device 200 for example. The data stored for this information can be updated in a manner discussed in any of the embodiments, previous and subsequent.
Figure 2 further illustrates an operative connection between the processor 210 and an antenna/receiver 250 via connection 255, wherein the antenna/receiver

250 can be a GPS antenna/receiver for example. It will be understood that the antenna and receiver designated by reference numeral 250 are combined schematically for illustration, but that the antenna and receiver may be separately located components, and that the antenna may be a GPS patch antenna or helical antenna for example.

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

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

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

The server 302 includes, in addition to other components which may not be illustrated, a processor 304 operatively connected to a memory 306 and further operatively connected, via a wired or wireless connection 314, to a mass data storage device 312. The processor 304 is further operatively connected to transmitter 308 and receiver 310, to transmit and send information to and from navigation device 200 via communications channel 318. The signals sent and received may include data, communication, and/or other propagated signals.

The transmitter 308 and receiver 310 may be selected or designed according to the communications requirement and communication technology used in the communication design for the navigation system 200. Further, it should be noted that the functions of transmitter 308 and receiver 310 may be combined into a signal transceiver.

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

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

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

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

through the communication channel and a receiver for receiving data that has been transmitted through the communication channel.

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

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

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

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

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

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

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

The mass storage device 312 connected to the server 302 can include volumes more cartographic and route data than that which is able to be maintained on the navigation device 200 itself, including maps, etc. The server 302 may process, for example, the majority of the devices of a navigation device 200

which travel along the route using a set of processing algorithms. Further, the cartographic and route data stored in memory 312 can operate on signals (e.g. GPS signals), originally received by the navigation device 200.

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

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

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

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

In at least one embodiment of the present application, a method includes determining a designated fuel type; and displaying selectable fuel pricing information on a display 240 of a navigation device 200, based upon the designated fuel type and in consideration of a location of the navigation device 200.

In at least one embodiment of the present application, a navigation device 200 includes a processor 210 to determine a designated fuel type; and an integrated input and display device 290 to display selectable fuel pricing information based upon the designated fuel type and in consideration of a location of the navigation device 200.

Figure 5A illustrates a process flow of an example embodiment of the present application, for displaying selectable fuel pricing information. Initially, in Step S2, a processor 210 of the navigation device 200 determines a designated fuel type, and subsequently in Step S4, selectable fuel pricing information is displayed on the display 240 of the navigation device 200, based upon the designated fuel type and in consideration of a location of the navigation device 200.

As shown in Figure 5B, an embodiment of the aforementioned method can include Steps S2 and S4 of Figure 5A, and can further include additional steps. For example, relating to the selectable icons, it can be determined in Step S6, by the processor 210 for example, whether or not a selectable icon was selected. If not, the icons remain displayed, and if so, the category of a selected icon can be determined, by the processor 210 for example, in Step S8. Thereafter, in Step S10, a listing of fuel providing stations can be displayed on display 240 for example, noting that the display 240 can be part of an integrated input and display device 290.

Figure 6 provides an illustration of an example display of a navigation device 200, which can be displayed on an integrated input and display device 290 of the navigation device 200 itself for example. As shown in Figure 6, selectable fuel pricing information is displayed, wherein the display includes a plurality of selectable icons 500, 510, 520, 530, 540, and 550. The plurality of selectable icons include at least one selectable icon to provide fuel pricing information based upon relative location (the "find by proximity" icon 500 for example), and

at least one selectable icon to provide fuel pricing information based upon relative pricing (the "find by price" icon 510 for example).

Further, Figure 6 illustrates an example of the plurality of selectable icons further including at least one selectable icon 530 displaying a relatively cheapest fuel price along a travel route; a selectable icon 540 displaying a relatively cheapest fuel price based upon proximity to a current location of the navigation device; and a selectable icon 550 displaying a relatively cheapest fuel price based upon location within a designated threshold distance from a current location of the navigation device 200. As shown with regard to selectable icon 540, the proximity may be that within a certain threshold distance range such as within fifty kilometers for example, noting that this distance is variable and a relatively nearest and cheapest fuel price may be any number of distances, wherein the processor 210 may determine, from fuel pricing information stored in memory 230 for example, a relatively cheapest fuel price within a designated proximity threshold, the designated proximity threshold being variable. The same applies to the 47 kilometer display of icon 550, noting that this number may or may not be displayed and the designated distance may be a variable threshold established by the processor 210, to search for location and fuel pricing information from information stored in the memory230 of the navigation device 200.

When the user desires to include a feature relating to display of fuel pricing information, the user may download a list of fuel points of interest or POIs (fuel or gas stations and their locations), and an associated list of prices. This can be done by connecting the navigation device 200 to a network to download information from a server 302 of Figure 3 for example, wherein the network connection may be a wireless connection, a mobile wireless connection made through a Bluetooth connection for example in a manner described previously, or a wired connection, through an Internet service provider. Preferably, a user can also designate which type of fuel information they want to download, based upon fuel type for example. The fuel type can be those of regular, mid-grade, premium, or diesel for example. Once a fuel type is designated, the aforementioned fuel pricing information for the selected fuel type can be downloaded.

Figure 7 illustrates one example of a fuel type selection screen that can be displayed to a user, on a display 240 or integrated input and display device 290 for example, wherein the user may select a desired fuel type for which pricing information is desired. It should be noted that this selection can be made to receive fuel pricing information via wired or wireless connection and can further be made to access updated fuel pricing information as will be discussed with regard to an additional embodiment of the present application.

The obtaining of the aforementioned fuel pricing information may be done on a subscription basis, wherein a user can subscribe to receive fuel pricing information from the server 302, in at least one of a wired or wireless manner, wherein the pricing information can first include initial pricing information and can later include updated pricing information. Once the connection is made, fuel pricing information can be downloaded to the navigation device 200 and a display screen 240 of an integrated input and display device 290 for example, such as that of Figure 8 can be displayed to the user to indicate that fuel pricing information is being downloaded. Again, this can occur in a wired or wireless manner, can occur for only fuel of a selected type, and/or can occur for receiving initial price information and/or updating information.

The fuel pricing information can include current prices of various types of gasoline, and/or for a selected type of gasoline, sold at gas stations throughout the country in which the navigation device 200 is being operated. For example, the fuel pricing information can include prices sold at approximately 80,000 gas stations in the United States. Price data may be derived from credit card transactions, direct feeds, and other survey methods for storage at a server 302 and for subsequent downloading to the navigation device 200. Therefore, the pricing information sent to a user of the navigation device 200 will vary based on traffic flow to particular gas stations and can be out of date (especially in a fluctuating fuel pricing market). Thus, the information is updatable as will be described later with regard to another embodiment of the present application.

The fuel pricing information may be provided to the server 302 through any number of providers, such as for example, a provider of petroleum pricing, that receives fuel information through fleet credit card transactions from 75,000 to 80,000 stations in the United States. This information can be integrated in any

number of ways, such as for example, a traffic provider who aggregates the information and who can output price file information in XML formatting, including, but not limited to, a unique station ID for each fuel providing or gas station, a product code ID for a fuel type (regular, mid-grade, premium, diesel), a transaction date, and a fuel price. This pricing information can then be stored at the server 302 and downloaded to be stored in memory 230 of each navigation device 200 when requested.

Figure 9 provides an example of a display screen 240 on a navigation device 200, including an icon 800 for accessing fuel pricing information, such as the fuel pricing screen of Figures 6 or 10 for example. Such a screen can be displayed to a user, for example, as one initial screen for selecting options prior to navigation use of the navigation device 200. When selected, the icon 800 can then be used to access the screen shown in Figure 10 of the present application, including a plurality of selectable icons 500, 510, 520, 530, 540, and 550 as previously described with regard to Figure 5 of the present application for example. Further discussion of these selectable icons will now be provided.

Upon receiving an indication of selection of the "Find by proximity" icon 500, the processor 210 can search through the memory 230 for fuel pricing information of the locations close in distance to a current location of the navigation device 200. The current location of the navigation device 200 is typically determined by receipt of a GPS signal for example, wherein the processor 210 can merely compare this received location with locations of various fuel stations stored in memory 203 and located near the navigation device 200. Thus, in response to receiving an indication of a selection of the "Find by proximity" icon 500 to provide fuel information based upon relative location, the processor 210 can determine and then can instruct integrated input and display device 290 of the navigation device 200 to display a listing of the fuel providing stations in an order determined by relative location to the navigation device (such a display can further include relative distance from the current location as well), calculated by the processor 210 from the current GPS location of the navigation device 200 and the stored locations of the fuel

providing stations. Such a display can be in an order of closest to furthest from a current location of the navigation device 200 for example.

The "Find by price" icon 510 can be selected to provide lists of fuel providing stations ranked by the processor 210 in an order determined by fuel price (preferably within a threshold distance from the current location of the navigation device 200 for example), cheapest to most expensive for example. Thus, upon the processor 210 receiving indication of selection of the "Find by price" icon 510 to provide pricing information based upon relative pricing, the processor 210 can determine and then instruct the integrated input and display device 290 to display a listing of fuel providing stations in an order determined based upon fuel pricing information, such as cheapest to most expensive for example (noting that the order can also be displayed from most expensive to cheapest for example)

Somewhat similarly, the processor 210 can utilize the stored pricing information, stored in memory 230 for example, in other different ways, depending upon a particular icon of Figure 10 which is selected. Regarding the "cheapest on route" icon 530, when an indication of selection of the icon 530 is received by the processor 210, the processor 210 can determine and then direct the integrated input and display device 290 to display detailed information regarding at least one fuel station providing the relatively cheapest fuel price along a travel route of the user (again, preferably within a threshold distance from the current location of the navigation device 200 for example). It should be noted that this can include a single gas station which is the relatively cheapest along the route of travel, and/or a selectable list of gas stations found on the users path of travel, ranked in order of cheapness of price information. Further, as shown by element 530 of Figure 10, the display can include display of the actual price of the relatively cheapest fuel price along the travel route. Thus, the selectable icon 530 can be reconfigured for display by processor 210 to display an icon displaying both a relatively cheapest price and the phrase "cheapest on route.

Again, upon the processor 210 receiving an indication of selection of the icon 530, the display can include a listing of gas stations or a single gas station ranked according to cheapest gas stations along the route of travel, including

detailed information of price, distance to gas station, etc., and then subsequent to selection of one of the listed gas stations, detailed information can be accessed by the processor 210 from memory 230 and displayed on the integrated input and display device 290 and thus provided to the user. Alternatively, upon selection of the icon 530, the processor 210 can access information on the a single relatively cheapest gas station on the route of travel from memory 230 and then the accessed information for the single relatively cheapest gas station on the travel route can be displayed on the integrated input and display device 290.

Somewhat similarly, upon the processor 210 receiving an indication of selection of the icon 540 to provide a relatively cheapest fuel price based upon proximity to a current location of the navigation device 200 (cheapest nearby icon 540 for example), the processor 210 can determine, and the integrated input and display device 290 can display detailed information regarding a fuel providing station providing the relatively cheapest fuel price based upon proximity to a current location of the navigation device. Thus, upon receipt of an indication of selection of icon 540 for example, a list of gas stations within a certain distance, such as 5 miles for example, (or just a single station within the proximity range and with the relatively cheapest price) can be displayed (in an order ranked by closeness to the location of the navigation device 200 for example), wherein a price of a relatively cheapest gas station within the proximity range may be displayed with the icon 540, as shown by the price of $1.49 for example. Thus, the selectable icon 540 can be reconfigured for display by processor 210 to display an icon displaying both a relatively cheapest price of the closest fuel station (along with the distance to this station, for example) and the phrase "cheapest on nearby".

Again, upon the processor 210 receiving an indication of selection of the icon 540, the display can include a listing of gas stations or a single gas station including detailed information of price, distance to station, etc., and then subsequent to selection of one of the listed gas stations, detailed information can be accessed by the processor 210 from memory 230 and displayed on the integrated input and display device 290 and thus provided to the user. Alternatively, upon selection of the icon, the processor 210 can access

information on the a single relatively cheapest gas station from memory 230 and then the accessed information for the single relatively cheapest gas station can be displayed on the integrated input and display device 290.

Finally, upon receipt of an indication of selection of an icon 550 to provide relatively cheapest fuel price based upon a location within a designated distance from a current location of the navigation device 200 (icon 550 entitled "cheapest in area"), a list of gas stations within a certain designated distance, such as within 35 miles for example, can be displayed. Upon selection of a gas station from the list, or directly after selecting the "cheapest in area" icon 550, detailed information can be accessed by the processor 210 from memory 230 and displayed on the integrated input and display device 290 regarding a fuel providing station providing a relatively cheapest fuel price based upon a location within a designated distance from a current location of the navigation device.

As previously indicated, upon selection of any of the icons 530, 540, and 550, detailed information regarding a relatively cheapest gas station on route, cheapest gas station within a proximity threshold, and/or cheapest gas station within a designated distance from a current location of the navigation device 200 may be displayed. Again, this detailed information can be displayed directly after selection of any of the icons 530, 540, 550, or subsequent to display of a list of gas stations and then selection thereof. In any event, the detailed information can include a display such as that shown in Figure 11 for example, displaying an informational display screen to the user. The informational display screen can include a display of the gas station location and a display of the route of travel for example, and can include additional information such as map information, a phone number, icons representing whether or not the location is along the route of travel, etc.

As shown in Figure 10, an icon 520 can be displayed for updating pricing information. Accordingly, upon the processor 210 receiving an indication of selection of the icon for updating pricing information, the updated pricing information may be received by the navigation device 200. As previously indicated, the updated pricing information may be stored in the memory 230 of the navigation device, after it is received in either a wired or wireless manner.

The updated pricing information can be received in a wireless manner via at least one of an antenna of the navigation device 200 and a connection via a mobile phone link, such as a Bluetooth link for example. As such, the updated pricing information can also be stored in memory 230 of the navigation device 200, along with the location of each of the plurality of fuel stations.

Further, the receipt and gathering of updated pricing information can further be refined. For example, when the processor 210 receives an indication of selection of the updating icon 520, a user may be prompted (with other additional icons or suggestions, for example) to refine the updating. For example, when the processor 210 receives an indication of selection of the updating icon 520, a user may be prompted to select an additional icon or statement corresponding to a request to update an area or all data. The area may be limited, for example, to a range extending a defined distance from a home of a user, a current location of a user, etc. This selection for updating only an area or range can further be set by the user of the navigation device 200 as a user preference (for example, before the use of the navigation device in a current navigation mode) or can be selected in response to a display prompt, for example.

Again, it should be understood that regarding the method of the present application described above, this can be embodied in the form of a navigation device 200. For example, in at least one embodiment, the navigation device 200 may include a processor 210 to determine a designated fuel type and an integrated input and display device 290 to display selectable fuel pricing information based upon the designated fuel type and in consideration of a location of the navigation device. The navigation device 200 may be portable, and may include at least one of an antenna and a wireless link connection, to connect to a mobile phone via a Bluetooth connection for example. It should be understood that a memory 230 of the navigation device 200 can store the received information and a processor 210 can determine the various information to be displayed.

In at least one other embodiment of the present application, a method includes displaying an icon for updating fuel pricing information; updating, upon receipt of an indication of selection of the icon for updating pricing information, fuel

pricing information; and displaying a plurality of selectable icons, usable to access the updated selectable fuel pricing information in consideration of a location of the navigation device, on a display of the navigation device. In another embodiment, a navigation device 200 includes a integrated input and display device 290 to display an icon for updating fuel pricing information and a processor 210 to update, upon receipt of an indication of selection of the icon for updating pricing information, fuel pricing information, the integrated input and display device 290 being usable to display a plurality of selectable icons, usable to access the updated selectable fuel pricing information in consideration of a location of the navigation device.

Figure 11 illustrates an alternative embodiment of a method of the present application. In this embodiment, an icon for updating fuel pricing information is displayed in step S20, such as the icon 520 of Figure 10 for example. Thereafter, the processor 210, for example, determines in step S22, whether or not an icon for updating fuel pricing information was selected. If not, the method returns to step S20. If so, the method proceeds to step S24.

In step S24, upon receipt of an indication of selection of the icon for updating pricing information, by processor 210 for example, fuel pricing information is updated (in memory 230 of the navigation device 200, for example). Thus, by merely selecting the icon 520 relating to "update prices," assuming that the navigation device 200 either has an antenna to receive updated pricing information and/or is connected or paired with a mobile telephone to establish a wireless mobile phone link, updated fuel pricing information can be received. Thereafter, in step S26, the processor 210 can instruct an integrated input and display device 290 of the navigation device 200 to display a plurality of selectable icons, usable to access the updated fuel pricing information in consideration of a location of the navigation device, on a display of the navigation device 200. For example, upon the pricing information being updated, displays such as that shown in Figure 10 can be displayed to a user, wherein the icons are usable to access updated fuel pricing information based upon various considerations of a location of the navigation device 200 such as a cheapest gas station along the route of the navigation device 200 (accessible via icon 530), a cheapest gas station proximate to a location of the navigation

device 200 (via selectable icon 540), and cheapest gas station within an area range of a location of the navigation device 200 (via selectable icon 550). With such a method, a user can easily be supplied with the most current updated fuel pricing information and thereafter can make a fuel pricing decision in a number of various ways.

Again, the updated fuel pricing information may be received in a wireless manner via at least one of an antenna of the navigation device 200 in connection via mobile phone link, and the updated fuel pricing information may be stored in a memory 230 of the navigation device 200 along with updated fuel pricing information and the location for a plurality of fuel providing stations. Somewhat similar to that described with regard to Figure 7 for example, a designated fuel type may be determined prior to receipt of the updated fuel pricing information, such that the updating will include updated fuel pricing information for the designated fuel type.

Again, the location of the navigation device 200 may be determined by receipt of a GPS signal for example.

Again, it should be understood that regarding the method of the present application described above, that this method can be embodied in the form of a navigation device 200. For example, in at least one embodiment, the navigation device 200 may include an integrated input and display device 290 to display an icon for updating fuel pricing information; and a processor 210 to update, upon receipt of an indication of selection of the icon for updating pricing information, fuel pricing information, the integrated input and display device 290 being useable to display a plurality of selectable icons, useable to access the updated selectable fuel pricing information in consideration of a location of the navigation device 200. The navigation device 200 may be portable, and may include at least one of an antenna and a wireless link connection, to connect to a mobile phone via a Bluetooth connection for example. It should be understood that a memory 230 of the navigation device 200 can store the received updated fuel pricing information and a processor 210 can determine the various information to be displayed.

The methods of at least one embodiment expressed above may be implemented as a computer data signal embodied in the carrier wave or propagated signal

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

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

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

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

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

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

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

Still further, any one of the above-described and other example features of the present invention may be embodied in the form of an apparatus, method, system, computer program and computer program product. For example, of the

aforementioned methods may be embodied in the form of a system or device, including, but not limited to, any of the structure for performing the methodology illustrated in the drawings.

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

What is claimed is:

1. A method of operating a navigation device characterized by the steps of:
storing locations of fuel providing stations, and
storing fuel pricing information relating thereto
determining a current location of the navigation device and
displaying fuel pricing information in a selectable manner on a display of said navigation device, such information being organized in a manner which takes the current location of the navigation device into account.

2. A method according to claim 1 including the further steps of storing a pre-designated fuel type, and displaying fuel pricing information in a selectable and at least partially restricted manner, such restriction being made according to fuel providing stations providing the pre-designated fuel type

3. The method of claim 1 or 2, wherein the location is of the navigation device is determined by receipt of a GPS signal.

4. The method of any preceding claim, wherein the displaying of selectable fuel pricing information includes displaying a plurality of selectable icons.

5. The method of claim 4, wherein the plurality of selectable icons includes at least two icons displayed in connection with a fuel price.

6. The method of claim 4 or 5, wherein the plurality of selectable icons includes at least one of a selectable icon to provide fuel pricing information based upon relative location and a selectable icon to provide fuel pricing information based upon relative pricing.

7. The method of claim 6, wherein the plurality of icons includes at least one of
- a selectable icon displaying a relatively cheapest fuel price along a travel route

- a selectable icon displaying a relatively cheapest fuel price based upon proximity to a current location of the navigation device, and
- a selectable icon displaying a relatively cheapest fuel price based upon location within a designated distance from a current location of the navigation device.

8. The method of claim 7, further comprising:

receiving at least one of

an indication of selection of the icon to provide relatively cheapest fuel price along a travel route,

an indication of selection of the icon to provide a relatively cheapest fuel price based upon proximity to a current location of the navigation device, and

an indication of selection of the icon to provide a relatively cheapest fuel price based upon location within a designated distance from a current location of the navigation device;

and consequently displaying a corresponding one of

information regarding a fuel providing station providing the relatively cheapest fuel price along a travel route,

information regarding a fuel providing station providing the relatively cheapest fuel price based upon proximity to a current location of the navigation device, and

information regarding a fuel providing station providing the relatively cheapest fuel price based upon location within a designated distance from a current location of the navigation device.

9. The method of any preceding claim, comprising the further steps of:

displaying an icon for updating at least one of fuel pricing and fuel providing station location information; and in response to an indication of selection thereof, receiving and storing said updated information.

10. The method of claim 9 when dependent on claim 2 including the further steps of determining a designated fuel type prior to receipt of the

updated fuel pricing information, wherein the updating includes updating fuel pricing information for the designated fuel type.

11. The method of claim 9 or 10, wherein the updated pricing information is received in a wireless manner via at least one of

- an antenna of the navigation device and
- a connection via a mobile phone link.

12. A computer program comprising computer program code means adapted to perform all the steps of any of claims 1-11 when run on a computer.

13. A computer program as claimed in claim 12 when embodied on or in a computer readable medium.

14. A navigation device adapted to carry out the methods of any of claims 1-10, and comprising:
a processor,
memory,
a display,
and an input device optionally integrated within the display.

15. The navigation device of claim 14, wherein the device is a portable navigation device including a GPS antenna for receiving GPS signals used in the determination of the current location of the device by the processor.

16. The navigation device of claim 14 or 15, further including includes at least one of an antenna and a connection via a mobile phone link to receive information in a wireless manner.

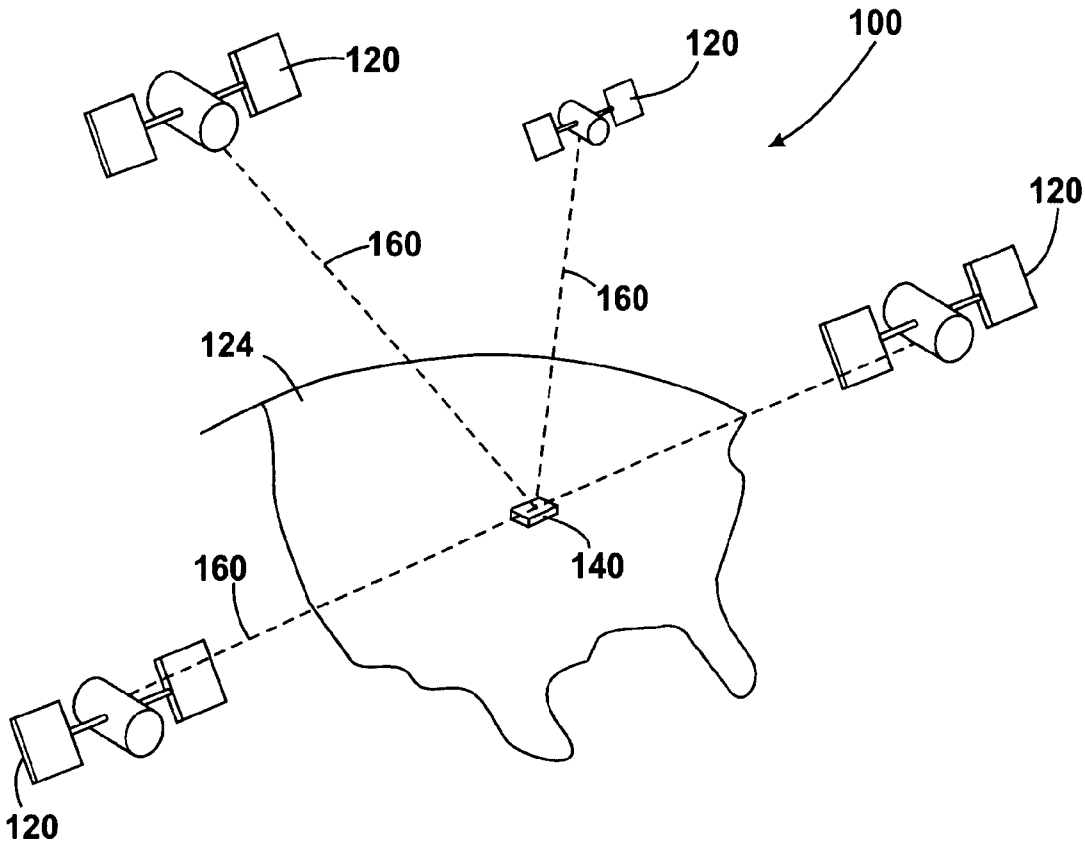
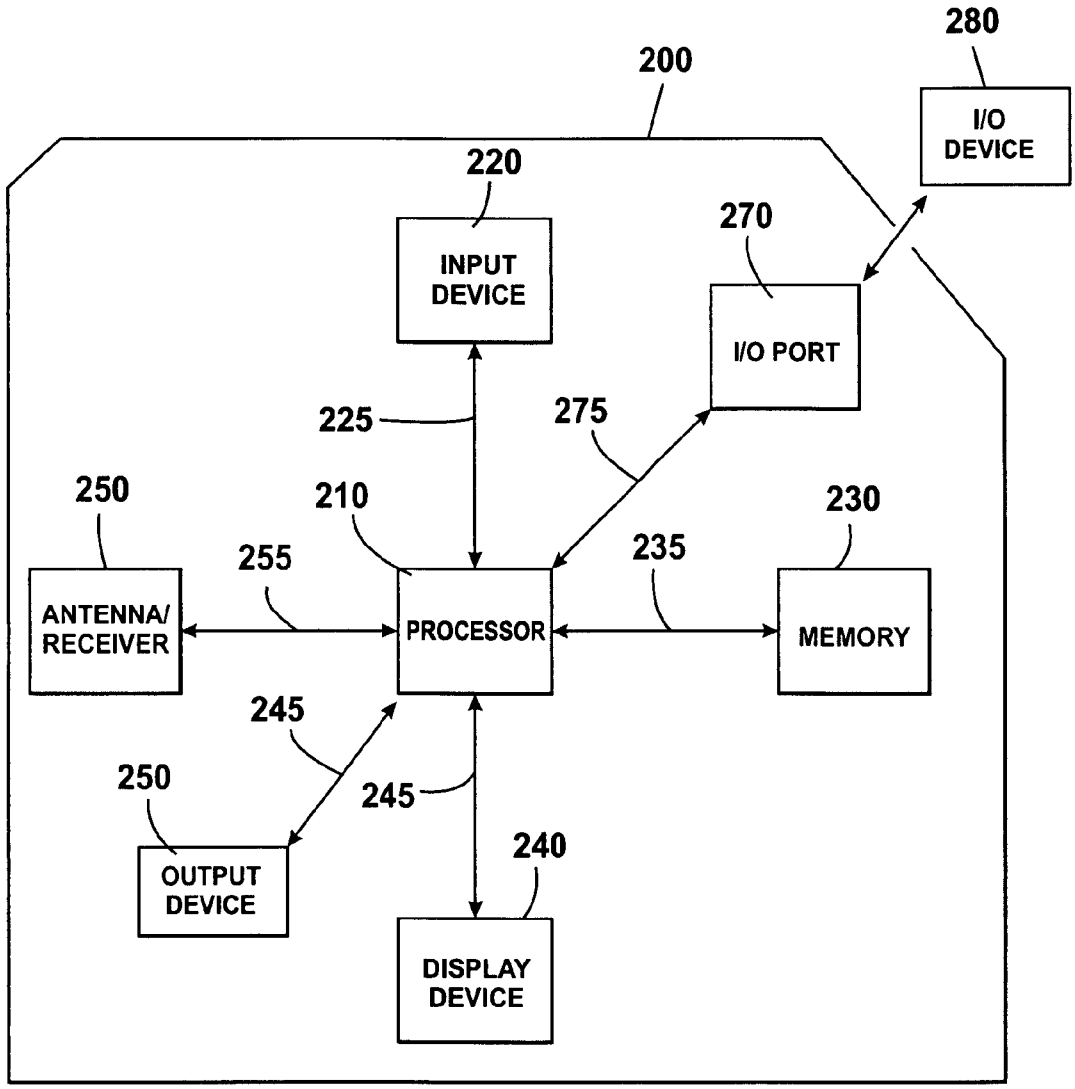


Fig. 1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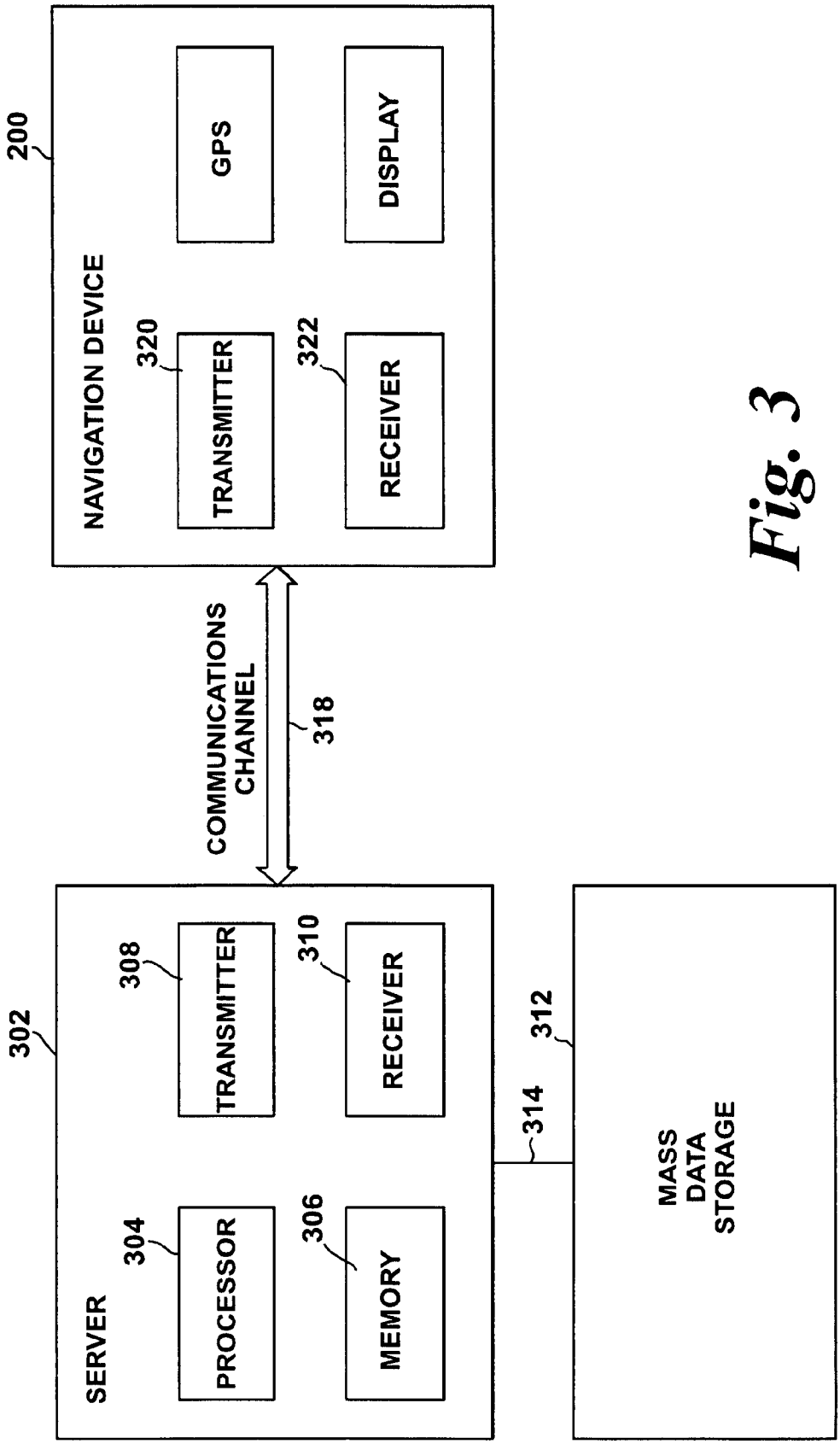
200
I/O DEVICE
220
INPUT DEVICE
270
I/O PORT
225
275
250
210
230
255
235
ANTENNA/ RECEIVER
PROCESSOR
MEMORY
245
250
245
240
OUTPUT DEVICE
DISPLAY DEVICE

Fig. 2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GPS
DISPLAY
320
TRANSMITTER
322
RECEIVER
COMMUNICATIONS CHANNEL
318
302
SERVER
308
TRANSMITTER
310
RECEIVER
304
PROCESSOR
306
MEMORY
314
312
MASS DATA STORAGE

Fig. 3

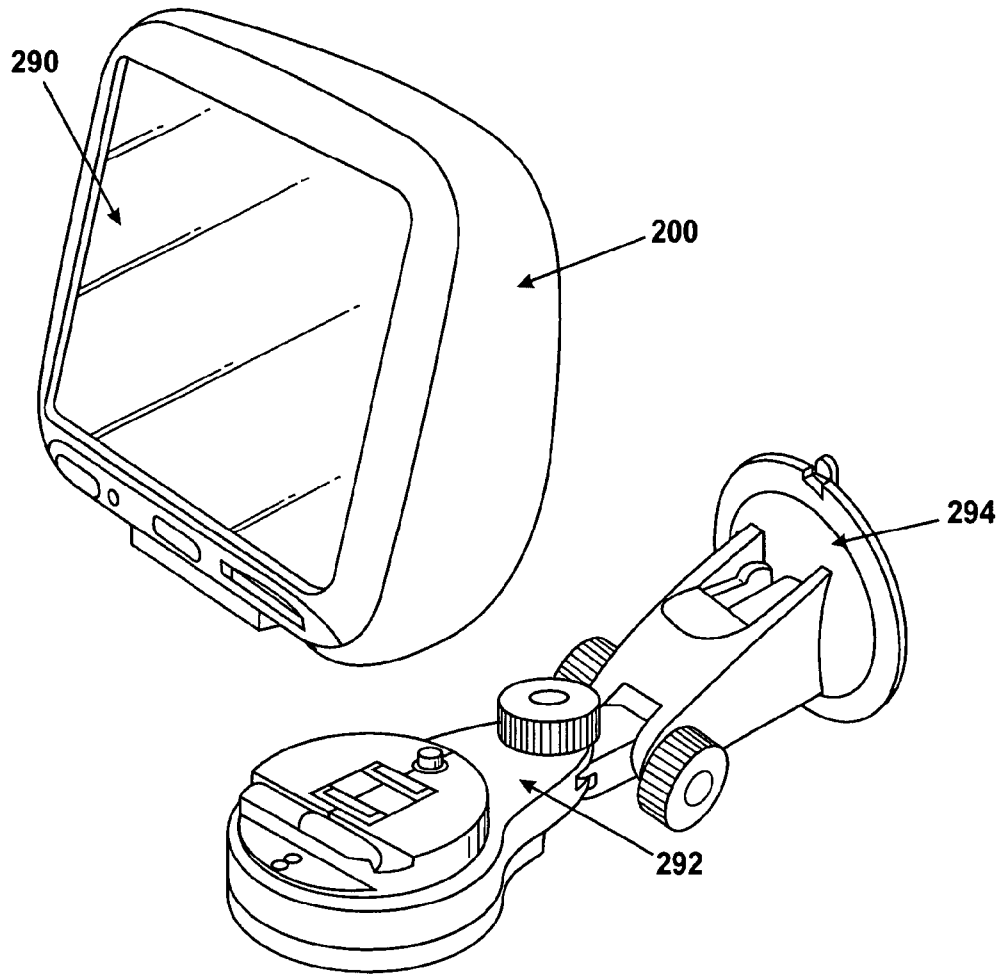


Fig. 4A

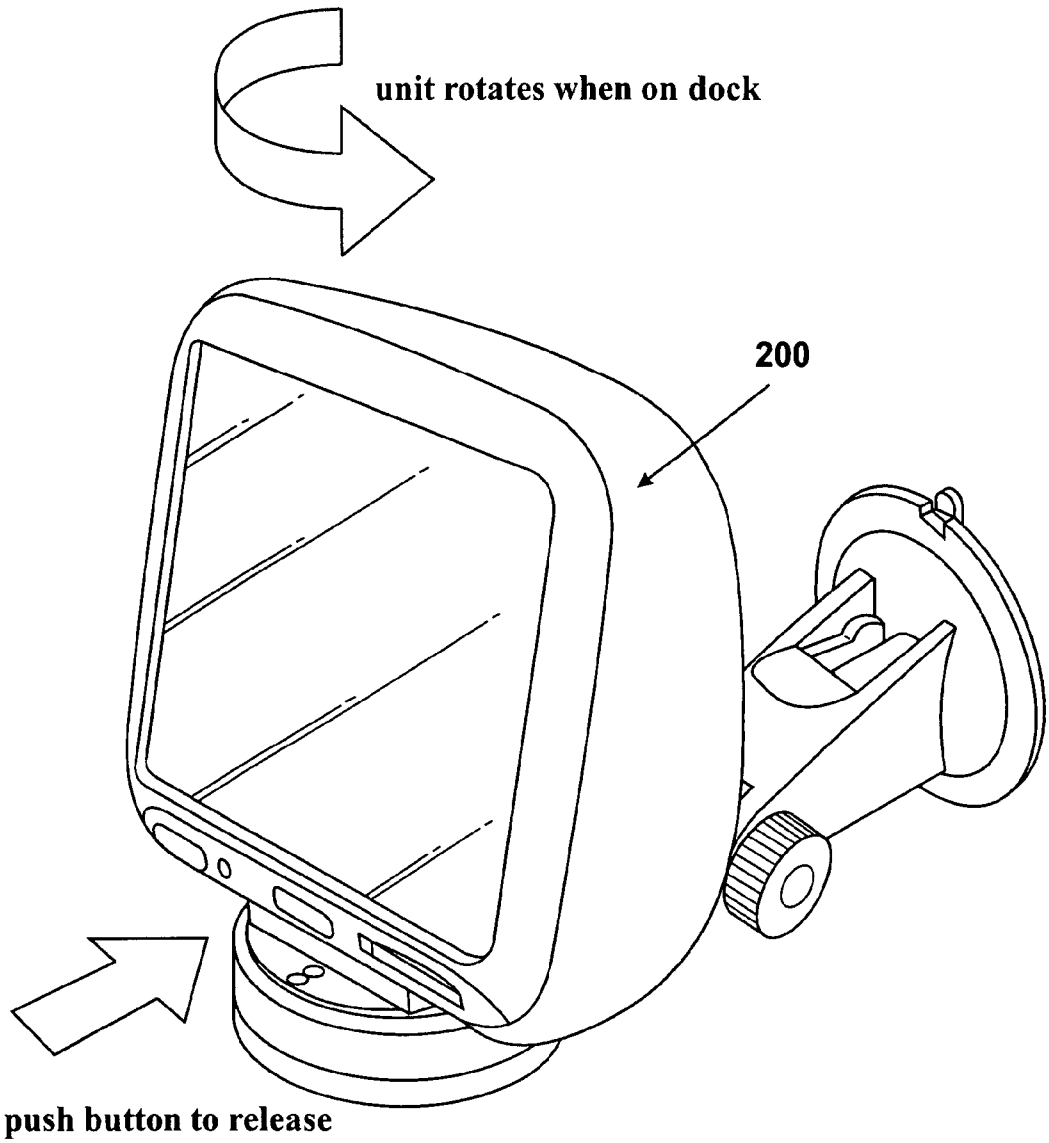


Fig. 4B

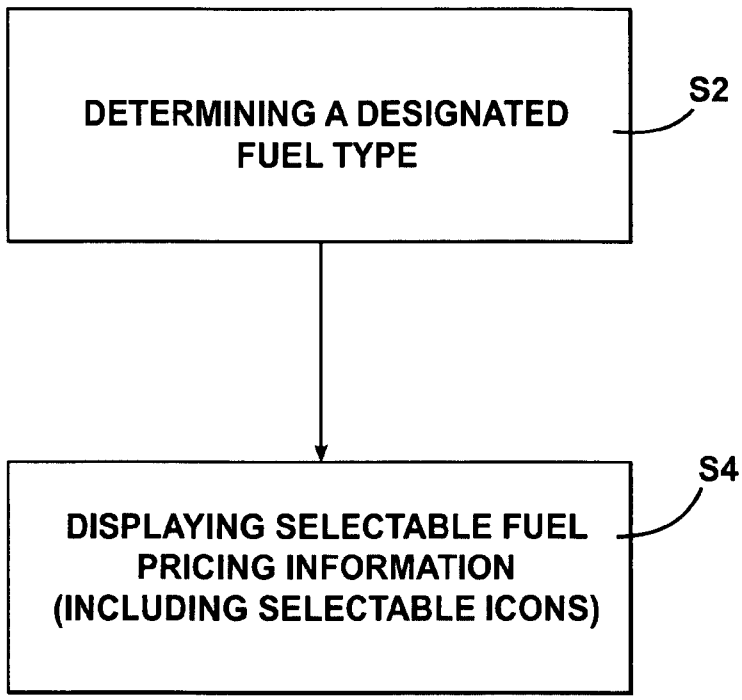

DETERMINING A DESIGNATED FUEL TYPE
S2
DISPLAYING SELECTABLE FUEL PRICING INFORMATION (INCLUDING SELECTABLE ICONS)
S4

Fig. 5A

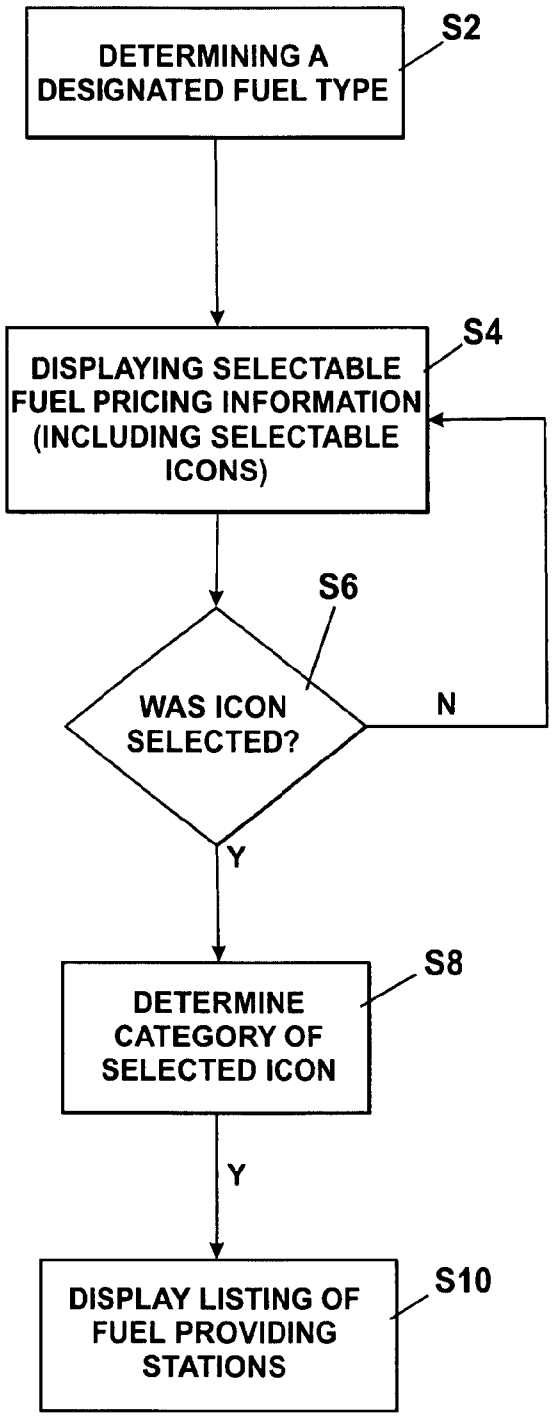

DETERMINING A DESIGNATED FUEL TYPE
S2
DISPLAYING SELECTABLE FUEL PRICING INFORMATION (INCLUDING SELECTABLE ICONS)
S4
S6
WAS ICON SELECTED?
N
Y
DETERMINE CATEGORY OF SELECTED ICON
S8
Y
DISPLAY LISTING OF FUEL PROVIDING STATIONS
S10

Fig. 5B

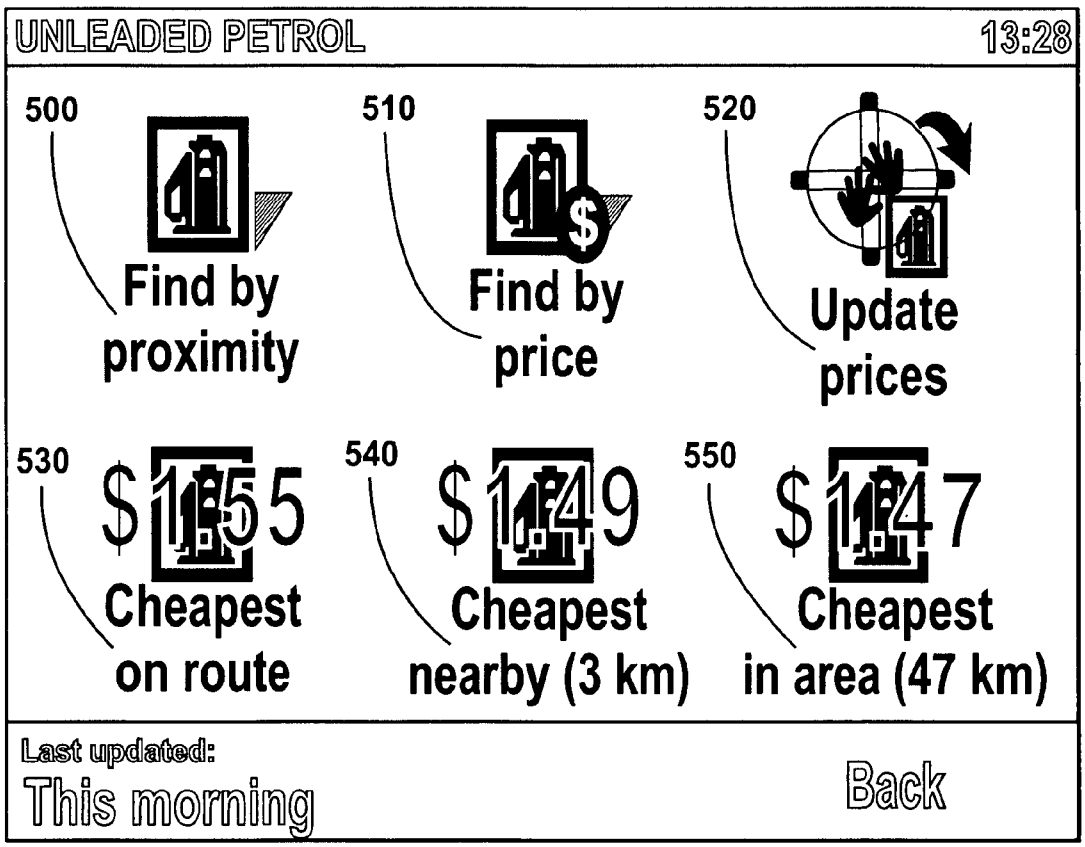

UNLEADED PETROL
13:28
500
Find by proximity
510
Find by price
520
Update prices
530
$1.55
Cheapest on route
540
$1.49
Cheapest nearby (3 km)
550
$1.47
Cheapest in area (47 km)
Last updated:
This morning
Back

Fig. 6

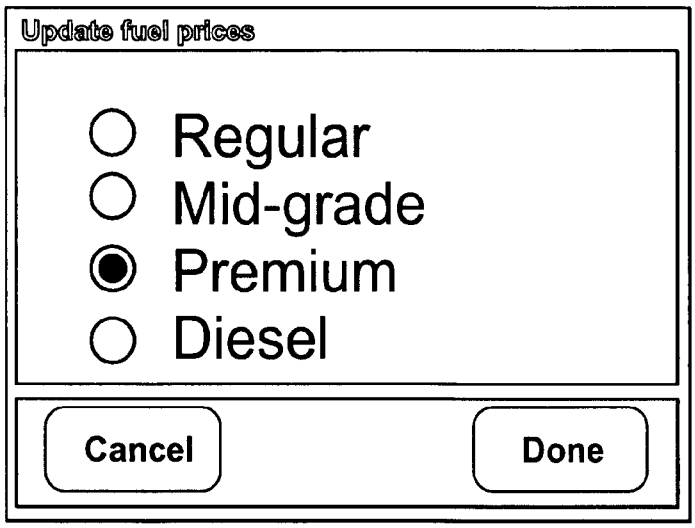

Update fuel prices
Regular
Mid-grade
Premium
Diesel
Cancel
Done

Fig. 7

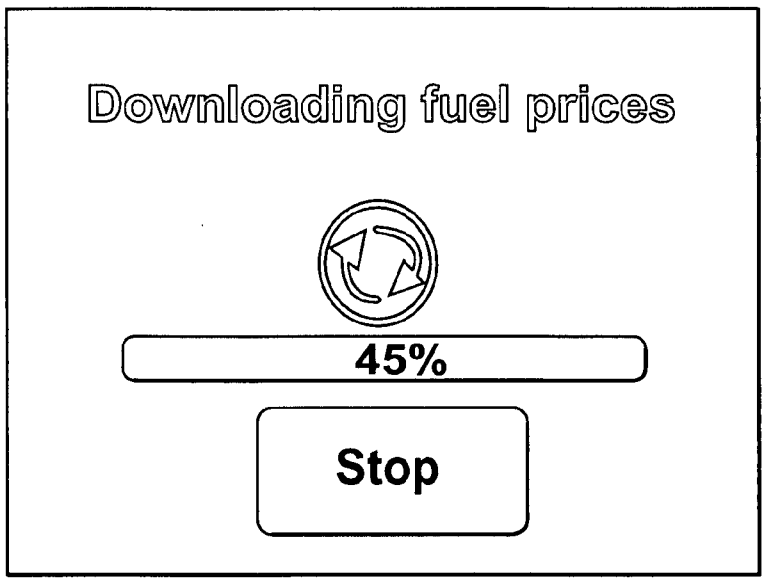
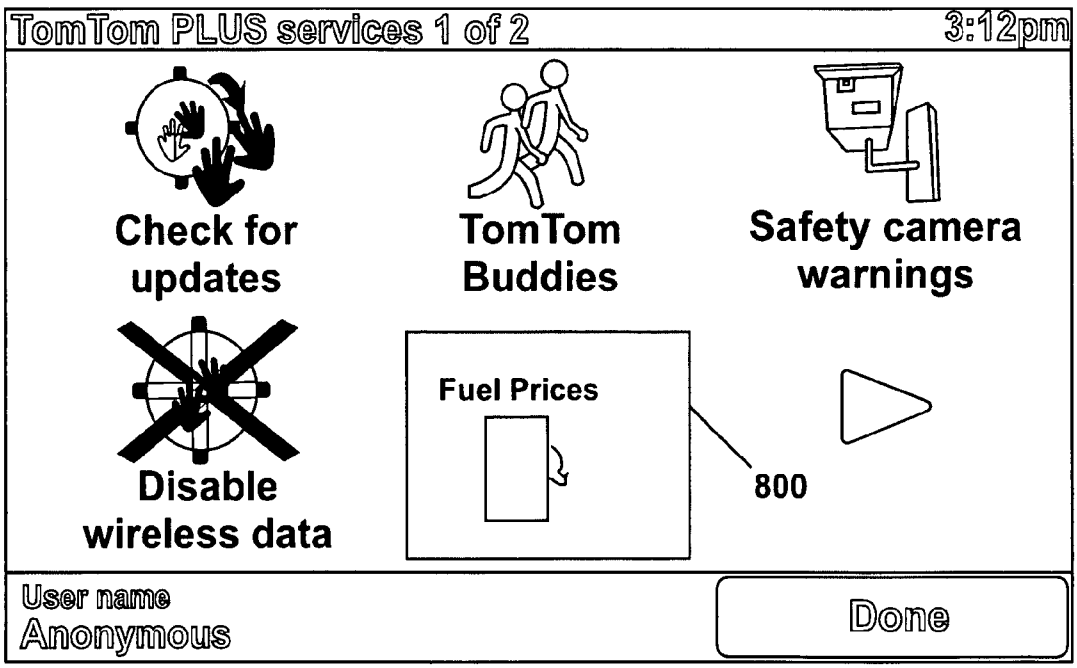


Fig. 8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Check for updates
TomTom Buddies
Safety camera warnings
Disable wireless data
Fuel Prices
800
User name
Anonymous
Done

Fig. 9

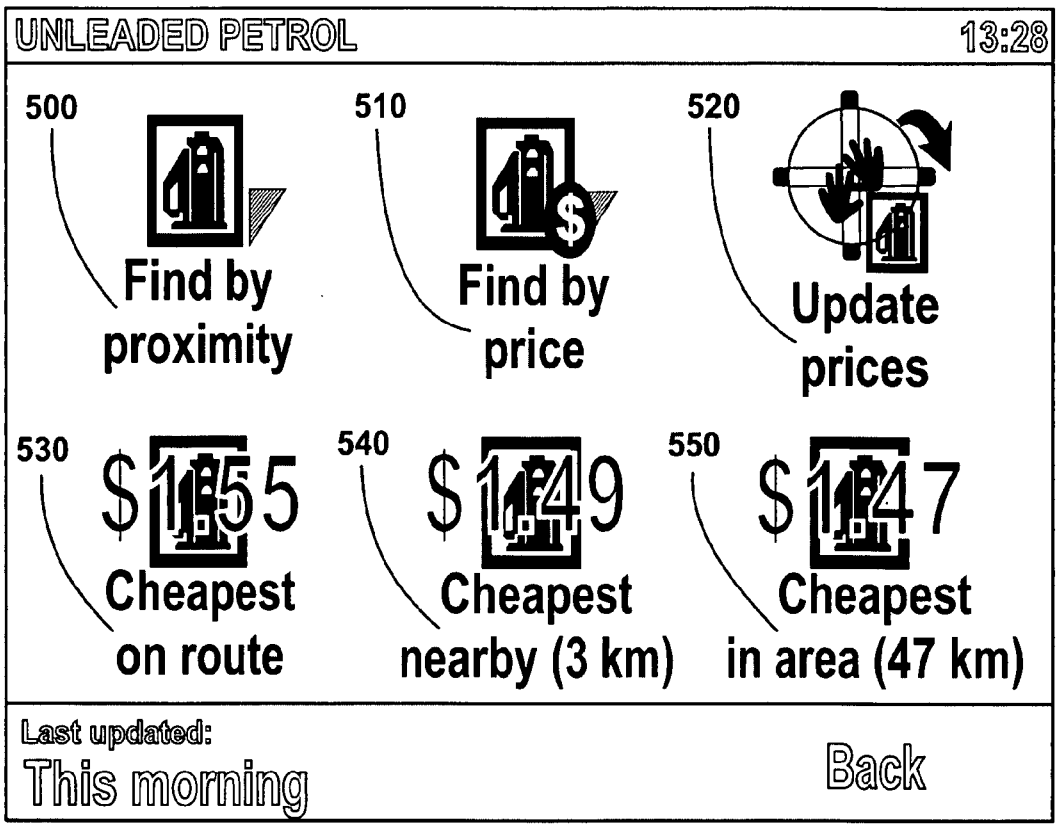
UNLEADED PETROL
13:28
500
Find by proximity
510
Find by price
520
Update prices
530
$1.55
Cheapest on route
540
$1.49
Cheapest nearby (3 km)
550
$1.47
Cheapest in area (47 km)
Last updated:
This morning
Back

Fig. 10

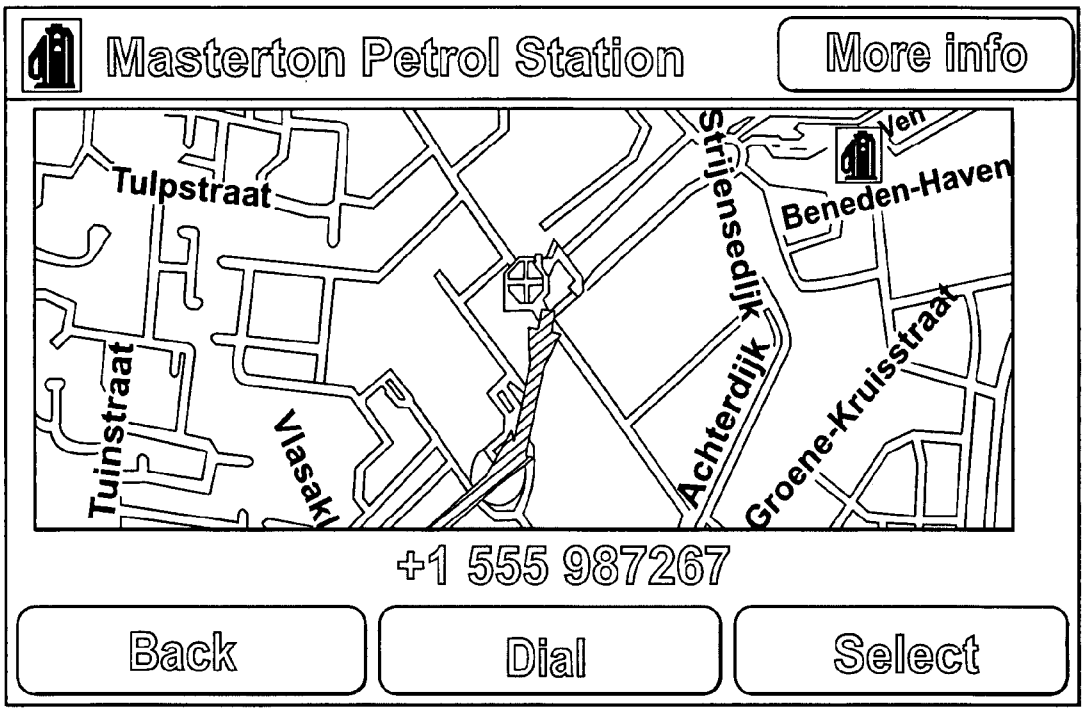
Masterton Petrol Station
More info
Tulpstraat
Strijensedijk
Ven
Beneden-Haven
Tuinstraat
Vlasakl
Achterdijk
Groene-Kruisstraat
+1 555 987267
Back
Dial
Select

Fig. 11

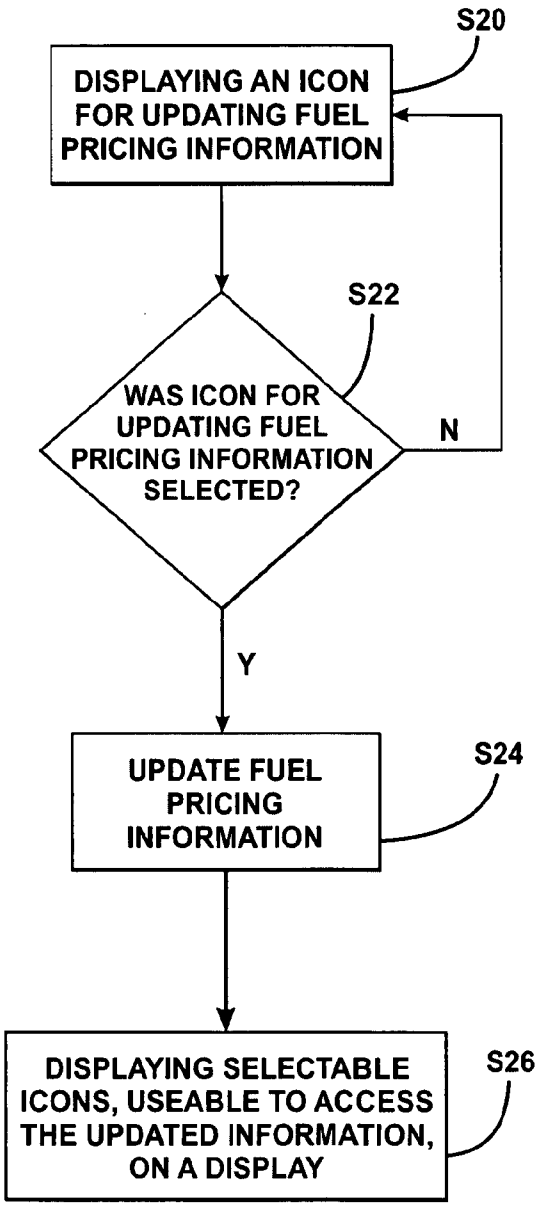
S20
DISPLAYING AN ICON FOR UPDATING FUEL PRICING INFORMATION
S22
WAS ICON FOR UPDATING FUEL PRICING INFORMATION SELECTED?
N
Y
UPDATE FUEL PRICING INFORMATION
S24
DISPLAYING SELECTABLE ICONS, USEABLE TO ACCESS THE UPDATED INFORMATION, ON A DISPLAY
S26

Fig. 12

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2007/008716

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01C21/26 G01C21/36
ADD. G08G1/0967

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/020088 A (SARKESHIK SHAHRIAR [US]) 23 February 2006 (2006-02-23) figure 18 paragraphs [0266] - [0269]	1-16
X	US 2002/059190 A1 (ISHIZAKI MITSURU [JP]) 16 May 2002 (2002-05-16) figures 2,7-9 paragraphs [0045], [0052] paragraphs [0068] - [0075]	1-16
X	US 2003/195700 A1 (HAMADA HIROYUKI [JP] ET AL) 16 October 2003 (2003-10-16) figures 11,15-18 paragraphs [0100], [0108] paragraphs [0142] - [0146]	1,3, 12-16

-/--

[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

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Date of the actual completion of the international search	Date of mailing of the international search report
4 January 2008	17/01/2008

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
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