Abstract: A method and device are disclosed for storing and utilizing a location at which a navigation device was last connected to a vehicle and/or was disconnected from a vehicle. In one embodiment, the method includes storing a positional location at which a navigation device was last connected to a vehicle; and determining a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was last connected to the vehicle. In another embodiment, the method includes storing a positional location of a navigation device upon disconnection from a vehicle; and determining a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was disconnected from the vehicle.
A NAVIGATION DEVICE AND METHOD FOR STORING AND UTILIZING A LAST DOCKED LOCATION

Priority Statement
The present application hereby claims priority under 35 U.S.C. § 119 on each of Great Britain Patent Application numbers 0604709.6 filed March 8, 2006; 0604708.8 filed March 8, 2006; 0604710.4 filed March 8, 2006; 0604704.7 filed March 8, 2006; and 0604706.2 filed March 8, 2006, the entire contents of each of which is hereby incorporated herein by reference.

Field
The present application generally relates to navigation methods and devices.

Background
Navigation devices are known to be portable, and are further known to be usable in conjunction with motorized vehicles such as cars, boats, etc (see for example, USP 7,142,980, the entire contents of which are incorporated herein by reference). Although navigation devices allow a user to get from a particular location to a travel destination, they typically begin from a GPS detected location of the navigation device itself, and end at an input/Selectable location. The travel destination is often selectable and thus is easy to input to enable a user to arrive at the travel destination using the navigation device. There are many methods which have been developed for inputting/selecting travel destinations in known navigation systems. However, there has not been much thought given to an initial position of the navigation device, as this is typically determined in a known manner using GPS location technology.

SUMMARY
The inventors of the present application noticed that there are times when initial position of the navigation device is important. For example, in situations where the navigation device is initially used in an automobile and is later utilized as a handheld device, the user may want to return to the automobile, but may not know its initial location. Further, the GPS location of the navigation device will not help, as the navigation device has moved from its
initial location in the vehicle to a new location. Thus, while the user can locate a plurality of selectable destinations, the user cannot locate the original vehicle in which the device was previously located. With the above in mind, at least one embodiment of the present application is directed to method which may be used, for example, to aid a user in determining a route to a vehicle where the navigation device was previously located or "last docked". In at least one embodiment, the method includes storing a positional location at which a navigation device was last connected to a vehicle; and determining a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was last connected to the vehicle.

In at least one other embodiment, a navigation device is disclosed, including a memory to store a positional location at which the navigation device was last connected to a vehicle, and a processor to determine a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was last connected to the vehicle.

In at least one other embodiment, a method includes storing a positional location of a navigation device upon disconnection from a vehicle, and determining a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was connected to the vehicle.

In at least one other embodiment, a navigation device includes a memory to store a positional location of the navigation device upon disconnection from a vehicle, and a processor to determine a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was disconnected from the vehicle.

**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;
Figure 4a illustrates a navigation device 200, docked to an example docking station 420;
Figure 4b illustrates an example navigation device which has been undocked from an example docking station of a vehicle; and
Figure 5 illustrates an example display of a "last docked" option.

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, 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 TCP/IP 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.

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 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.
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. Figure 4a illustrates a navigation device 200, docked to an example docking station 420. The docking station 420 is mountable and/or connectable to a vehicle 400, for mounting the navigation device 200 in a vehicle and for electrical connecting the navigation device 200 to the vehicle 400. The docking station 420 is adapted to receive the navigation device 200, and may provide
one or both of a physical connection and an electrical connection between the navigation device 200 and the vehicle 400. Thus, upon the docking station 420 receiving the navigation device 400 and upon the docking station 420 providing both of a physical connection and an electrical connection, the navigation device 200 may switch from a supply of power from an internal power supply (9 volt for example) to a supply of power from the vehicle (6 volt for example). The docking station 420 may be any kind of docking station for at least one of physically and/or electrically connecting the navigation device 200 to the vehicle 400; and the vehicle 400 can include any type of vehicle such as a car, motorcycle, truck, boat, etc., wherein the embodiments of the present application are not limited to the type of vehicle and include any vehicle 400 to which a navigation device 200 can be attached via a docking station 420. Further, embodiments of the present application are not limited to any type of docking station 420.

In Figure 4b, an illustration is provided of a navigation device 200 which has been undocked (losing at least one or both of an electrical and/or physical connection from the vehicle 400, for example) from a docking station 420 of the vehicle 400 and thus which is shown separately from the vehicle 400 including the docking device 420.

In one example embodiment of the present application, a positional location at which the navigation device 200 was last connected to a vehicle 400 is stored. Thereafter, upon the navigation system 200 being removed from the vehicle 200, a route to the vehicle can be determined based upon a current location of the navigation device 200 and the stored positional location at which the navigation device 200 was last connected to the vehicle 400. Thus, if the user forgets where his/her car is parked, for example, he/she can easily find the car via the determined route.

As the navigation device 200 is placed in the docking device 420 of the vehicle 400, the navigation device 200 may be triggered store the GPS positional location of the navigation device 200 as measured while the navigation device 200 is in the docking device 420. This can occur, for example, upon detecting a connection (physical, electrical, etc.) between the navigation device 200 and the vehicle 400, via docking station 420 for example.
With regard to docking, for example, two kinds of docking may be used, for example: active and passive. Active docking includes a docking station 420 that includes electrical circuits that trigger, in an electrical way, the navigation device 200, when docked, so that the navigation device 200 always knows if it is docked or not by way of an electrical signal. Thus, detection of a docked (connected) or undocked (disconnected) state can be done using detection of these electrical signals, and/or detection of a lack thereof.

Passive docking includes docking the navigation device 200 to the vehicle 400 in a way that does not include any electrical circuits (it may not even include use of a docking station 420). It is just a way to firmly attach the navigation device 200 to the windscreen, dashboard, etc. of a vehicle 400. Still there are ways to detect a docked or undocked state (and thus trigger storage of a last docked location for example) in these passive docking systems as well.

For example, this can be done, in one example embodiment, by using a "push" sensor that is switched by a mechanical connection of the docking when the navigation device 200 is attached and/or removed. In such a manner, the navigation device 200 may be mechanically connected to the vehicle 400, via a passive docking station 420 for example. For such a "push" sensor, a small switch may be automatically activated by a connection mechanism when the navigation device 200 is connected to a docking station 420, for example.

In another embodiment, "passive" docking can be detected using a magnet, in the docking station 420 for example. Such a magnet can be sensed electrically by a sensor in the navigation device 200, for example.

A "last docked" position may be stored, in one example embodiment, by storing the current position as long as the system is "docked" in the docking station 420, for example. In this way, the navigation device 200 does not need to detect any actual connection/disconnection from the docking station 420, for example. Thus, instead a condition of the vehicle 400 can be detected, indicating a connection between the navigation device 200 and the vehicle 400, wherein the positional location is stored upon detecting the condition. That can be beneficial because, in most cases, the navigation device 200 may be switched off before disconnection from the docking station 420 (and when in a switched-off state, there may be no way to store current position).
In at least one embodiment, a connected condition is determined, to determine "docked" state via software, i.e. without sensors or mechanical/electrical switches. The software can determine whether the navigation device 200 was used in a different location before. This algorithm can use to detect a condition for example, including movement of the vehicle such as speed, for example. Driving with the navigation device 200 occurs at a much higher speed than walking with the navigation device 200, for example. The algorithm can use, but is not limited to heuristics to detect a condition for example. This can be done, for example, by detecting that the navigation device 200 has moved more than a certain distance, for example one km before it was switched off. If the navigation device 200 is now switched on again, the location where it was switched off may be stored as a "last docked" location. This one km barrier is an example of a barrier which can be used to prevent the navigation device 200 from overriding a "last docked" position with current GPS location.

In one example embodiment, an electrical connection between the navigation device and the vehicle 400, via docking station 420 for example, may be monitored. Upon detecting an electrical connection between the navigation device 200 and the vehicle 400, via docking station 420 for example, the positional location of the navigation may be stored as a last docked location and a route can be determined based upon the stored last docked location. One example embodiment of this is as follows.

In one example embodiment of detecting electrical connection, voltage/current supply from a battery of the vehicle in which the navigation device 200 is docked, for example, can be monitored. For example, the processor 210 can monitor the voltage/current supply to the navigation device 200. Thereafter, upon detecting a voltage/current supply change upon connection of the navigation device 200 to the docking station in a known manner for example, wherein an automatic switch occurs from a 9 volt internal supply to a 6 volt supply from the battery of the vehicle in which the navigation device 200 is now docked for example, the processor 210 can then request a GPS position signal from antenna/receiver 250. Upon receiving this position signal, it can then store this "last docked" location in memory 230. Thus, for example, when the
navigation device 220 is locked or "docked" in the docking device 420 of the vehicle 400, a "last docked position" may be stored in a memory 230 of the navigation device 220 (and a route can thereafter be determined based upon the stored last docked location).

Alternatively, other types of triggers for storage of a "last docked" position can be used and are within the scope of the embodiments of the present application. In one example embodiment, a physical connection between the navigation device and the vehicle 400, via docking station 420 for example, may be monitored. Upon detecting a physical connection between the navigation device 200 and the vehicle 400, via docking station 420 for example, the positional location of the navigation may be stored as a last docked location (and a route can thereafter be determined based upon the stored last docked location).

In one example embodiment of detecting physical connection, a physical sensor may be used (not shown), to sense that a connection between the docking device 420 and the navigation device 200 (via physical connectors of the navigation device 200 being connected to physical connectors of the docking device 420, for example). The processor 210 can then monitor or await a signal from the sensor, upon the sensor detecting a physical connection between the docking device 420 and the navigation device 200. Upon the processor 210 receiving a signal or detecting a signal from the sensor indicating a physical connection between the docking device 420 and the navigation device 200, the processor 210 can then request a GPS position signal from antenna/ receiver 250. Upon receiving this position signal, it can then store this "last docked" location in memory 230 and a route can be determined based upon the stored last docked location. Thus, at the time of docking or connecting the navigation device 200 to the vehicle 400, via the docking device 420 for example, a positional location of the navigation device may be stored in memory 230 of the navigation device 200 for example.

Thereafter, when a user undocks or removes the navigation device 200 from the docking station 420 and takes the navigation device 200 with him or her, the user may forget where the vehicle 400, including the docking station 420 and previously connected to the navigation device 200, was located. This could
happen, for example, when a user parks his/her vehicle in a mall, airport parking lot, parking garage, etc. and cannot remember where the car is located. However, as the "last docked" location is now stored (in any manner of the aforementioned embodiments for example), the method of an embodiment of the present application can now determine a route to the vehicle in a known manner, based upon a current GPS location of the navigation device 200 (determined in a known manner) and based upon the stored positional location at which the navigation device 200 was last connected to the vehicle.

In one embodiment of the present application, as shown in Figure 5 for example, the navigation device 200 of the user can further be prompted (via display of the "@ last docked" option 510 of Fig. 5 for example) to select an option to access the positional location at which the navigation device 200 was last connected to the vehicle 400. In response to selection of this option, the navigation device 200 can then determine, in a known manner, a route to the vehicle based upon a current location of the navigation device (which is always known based upon the GPS antenna receiver 250 of the navigation device 200 receiving signals to determine a current GPS location of the navigation device 200) and the stored positional location at which the navigation device 200 was last connected to the vehicle 400 (namely the "last docked" location which has been stored in memory 230). Once the route is determined, it may then be displayed on the navigation device and can then be used to aid the user in reaching the vehicle 400. As such, the user can use the navigation device itself to find the vehicle at which it was last docked.

It should be noted that the device prompt and the display device may be, and typically is, an integrated input and display device. However, the prompt may occur in other ways, such as via other types of visual prompts, an audible prompt, a physical flashing prompt prompting selection of a physical button and/or a "home" option which may be permanently displayed on the device, etc.

The embodiments of the present application are not limited to the particular prompt which is used, and/or the method used to select a particular option to access the positional location at which the navigation device was last connected to the vehicle.
An embodiment of the present application may further be present in the form of the navigation device 200 itself. The navigation device 200 can include a memory 230 to store a positional location at which the navigation device 200 was last connected to a vehicle 400; and a processor 210 to determine a route to the vehicle based upon a current location of the navigation device 200 and the stored positional location at which the navigation device was last connected to the vehicle 200. Further, the navigation device 200 may further include a device (including but not limited to display 240 for example) to prompt selection of an option to access the positional location at which the navigation device 200 was last connected to the vehicle 400, wherein the processor 210 can determine the route to the vehicle 400 in response to selection of the option, based upon a current location of the navigation device 200 and the stored positional location at which a navigation device 200 was last connected to the vehicle 400. The navigation device 200 of an embodiment of the present application may further include a display device to display the determined route to the vehicle 400 on the navigation device 200. The device to prompt and the display device may further be integrated.

In another example embodiment of the present application, a positional location at which the navigation device 200 was last disconnected from a vehicle 400 is stored. Thereafter, upon the navigation system 200 being removed from the vehicle 200, a route to the vehicle can be determined based upon a current location of the navigation device 200 and the stored positional location at which the navigation device 200 was last disconnected from the vehicle 400. Thus, if the user forgets where his/her car is parked, for example, he/she can easily find the car via the determined route.

In an embodiment of the present application, instead of storing a positional location at which a navigation device 200 was last connected to a vehicle 400, a positional location of a navigation device 200 may be stored at which a navigation device 200 was last disconnected from a vehicle 400, for example, upon disconnection from a vehicle 200 (such as upon disconnection of the navigation device 200 from a docking device 420 of the vehicle 400, for example). This can occur in a manner similar to that regarding connection to the vehicle, wherein disconnection is detected instead of connection, and
wherein the disconnection can be a disconnection which is physical, electrical, etc. For example, the disconnection detected may be electrical, upon detecting a switch from the voltage supply from a battery of the vehicle in which the navigation device 200 is docked, for example, to a voltage supply of the navigation device 200 itself.

In one example embodiment, an electrical connection between the navigation device and the vehicle 400, via docking station 420 for example, may be monitored. Upon detecting an electrical disconnection between the navigation device 200 and the vehicle 400, via docking station 420 for example, the positional location of the navigation may be stored as a last docked location and a route can be determined based upon the stored last docked location. One example embodiment of this is as follows.

In one example embodiment of detecting electrical disconnection, voltage/current supply from a battery of the vehicle in which the navigation device 200 is docked, for example, can be monitored. For example, the processor 210 can monitor the voltage/current supply to the navigation device 200. Thereafter, upon detecting a voltage/current supply change upon disconnection of the navigation device 200 to the docking station in a known manner for example, wherein an automatic switch occurs from a 6 volt supply from the battery of the vehicle in which the navigation device 200 is now docked for example, to a 9 volt internal supply, the processor 210 can then request a GPS position signal from antenna/receiver 250. Upon receiving this position signal, it can then store this "last docked" location in memory 230. Thus, for example, when the navigation device 220 is remove or "undocked" from the docking device 420 of the vehicle 400, a "last docked position" may be stored in a memory 230 of the navigation device 220 (and a route can thereafter be determined based upon the stored last docked location).

Alternatively, other types of triggers for storage of a "last docked" position can be used and are within the scope of the embodiments of the present application. In one example embodiment, a physical disconnection between the navigation device and the vehicle 400, via docking station 420 for example, may be monitored. Upon detecting a physical disconnection between the navigation device 200 and the vehicle 400, via docking station 420 for example, the
positional location of the navigation may be stored as a last docked location (and a route can thereafter be determined based upon the stored last docked location).

In one example embodiment of detecting physical disconnection, a physical sensor may be used (not shown), to sense that a disconnection between the docking device 420 and the navigation device 200 (via physical connectors of the navigation device 200 being connected to physical connectors of the docking device 420, for example). The processor 210 can then monitor or await a signal from the sensor, upon the sensor detecting a physical disconnection between the docking device 420 and the navigation device 200. Upon the processor 210 receiving a signal or detecting a signal from the sensor indicating a physical disconnection between the docking device 420 and the navigation device 200, the processor 210 can then request a GPS position signal from antenna/ receiver 250. Upon receiving this position signal, it can then store this "last docked" location in memory 230 and a route can be determined based upon the stored last docked location.

Accordingly, in one embodiment, upon a disconnection from a vehicle 200, such as from a docking device 420 of a vehicle 200, a positional location of the navigation device 200 may be stored. Thereafter, a route to the vehicle 200 may be determined based upon a current location of the navigation device 200 and the stored positional location at which the navigation device 200 was disconnected from the vehicle 400. In a further embodiment, a selection of an option to access the positional location may be prompted, and in response to selection of the option, a route to the vehicle 200 may be determined based upon a current location of the navigation device 200 and the stored positional location at which the navigation device 200 was disconnected from the vehicle 400. Such methods of embodiments of the present application, once the positional location is stored in memory 230, can operate in a manner similar to that of the previously described embodiments.

Further, an embodiment of the present application may be directed to a navigation device 200, including a memory 230 to store a positional location of the navigation device 200 upon disconnection from the vehicle 400; and a processor 210 to determine a route to the vehicle 400 based upon a current
location of the navigation device 200 and the stored positional location at which the navigation device 200 was disconnected from the vehicle 400. In a further embodiment, a device (including but not limited to display 240 for example) may be included to prompt selection of an option to access the positional location, the processor 210 determining, in response to selection of the option, a route to the vehicle 400. Further, a display device to display the determined route to the vehicle 400 on the navigation device 200 can also be included, noting that the device to prompt and the display device may be integrated.

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, comprising:
   storing a positional location at which a navigation device was last connected to a vehicle;
   determining a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was last connected to the vehicle.

2. The method of claim 1, further comprising:
   prompting selection of an option to access the positional location at which the navigation device was last connected to the vehicle, the determining of the route occurring in response to selection of the option.

3. The method of claim 2, further comprising:
   displaying the determined route to the vehicle on the navigation device.

4. The method of claims 1-3, further comprising:
   detecting a connection between the navigation device and the vehicle, wherein the positional location is stored upon detecting the connection.

5. The method of claim 4, wherein the connection is detected upon detecting an electrical connection between the navigation device and the vehicle.

6. The method of claim 4, wherein the connection is detected upon detecting a physical connection between the navigation device and the vehicle.

7. The method of claims 1-6, wherein the connection between the navigation device and the vehicle occurs via a docking device, connected to the vehicle and adapted to receive the navigation device.
8. The method of claim 4, wherein the detecting includes detecting a connection between the navigation device and the vehicle via a docking device, connected to the vehicle and adapted to receive the navigation device.

9. The method of claim 5, wherein the connection is detected upon detecting an electrical connection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

10. The method of claim 6, wherein the connection is detected upon detecting a physical connection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

11. The method of claim 4, wherein the connection is detected upon detecting a physical connection between the navigation device and a docking device, connected to the vehicle and adapted to receive the navigation device.

12. A computer readable medium including program segments for, when executed on a processor of a navigation device, causing the navigation device to implement the method of claim 1.

13. The method of claims 1-12, further comprising:
   detecting a condition of the vehicle, indicating a connection between the navigation device and the vehicle, wherein the positional location is stored upon detecting the condition.

14. The method of claim 13, wherein the condition detected includes movement of the vehicle.

15. The method of claim 13, wherein the condition detected using heuristics.

16. The method of claim 13, wherein the condition is detected by software.
17. The method of claim 5, wherein the electrical connection is detected by a sensor.

18. The method of claim 6, wherein the physical connection is detected by a sensor.

19. A navigation device, comprising:
   means for storing a positional location at which the navigation device was last connected to a vehicle; and
   means for determining a route to the vehicle based upon a current location of the navigation device and the stored positional location at which a navigation device was last connected to a vehicle.

20. The navigation device of claim 19, further comprising:
   means for prompting selection of an option to access the positional location at which the navigation device was last connected to the vehicle, the determining of the route occurring in response to selection of the option.

21. The navigation device of claim 20, further comprising:
   means for displaying the determined route to the vehicle on the navigation device.

22. The navigation device of claims 19-21, further comprising:
   means for detecting a connection between the navigation device and the vehicle, wherein the positional location is stored upon detecting the connection.

23. The navigation device of claim 22, wherein the connection is detected upon detecting an electrical connection between the navigation device and the vehicle.
24. The navigation device of claim 22, wherein the connection is detected upon detecting a physical connection between the navigation device and the vehicle.

25. The navigation device of claims 19-24, wherein the connection between the navigation device and the vehicle occurs via a docking device, connected to the vehicle and adapted to receive the navigation device.

26. The navigation device of claim 22, wherein the detecting includes detecting a connection between the navigation device and the vehicle via a docking device, connected to the vehicle and adapted to receive the navigation device.

27. The navigation device of claim 23, wherein the connection is detected upon detecting an electrical connection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

28. The navigation device of claim 24, wherein the connection is detected upon detecting a physical connection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

29. The navigation device of claim 22, wherein the connection is detected upon detecting a physical connection between the navigation device and a docking device, connected to the vehicle and adapted to receive the navigation device.

30. The navigation device of claim 21, wherein the means for prompting and the means for displaying are integrated.

31. The navigation device of claims 19-30, further comprising:
means for detecting a condition of the vehicle, indicating a connection between the navigation device and the vehicle, wherein the positional location is stored upon detecting the condition.

32. The navigation device of claim 31, wherein the condition detected includes movement of the vehicle.

33. The navigation device of claim 31, wherein the condition detected using heuristics.

34. The navigation device of claim 31, wherein the condition is detected by software.

35. The navigation device of claim 23, wherein the electrical connection is detected by a sensor.

36. The navigation device of claim 24, wherein the physical connection is detected by a sensor.

37. A navigation device, comprising:
   memory to store a positional location at which the navigation device was last connected to a vehicle; and
   a processor to determine a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was last connected to the vehicle.

38. The navigation device of claim 37, further comprising:
   a device to prompt selection of an option to access the positional location at which the navigation device was last connected to the vehicle, the determining of the route occurring in response to selection of the option.

39. The navigation device of claim 38, further comprising:
a display device to display the determined route to the vehicle on the navigation device.

40. The navigation device of claims 37-39, wherein the processor is further used to detect a connection between the navigation device and the vehicle, wherein the positional location is stored upon detecting the connection.

41. The navigation device of claim 40, wherein the connection is detected upon detecting an electrical connection between the navigation device and the vehicle.

42. The navigation device of claim 40, wherein the connection is detected upon detecting a physical connection between the navigation device and the vehicle.

43. The navigation device of claims 37-42, wherein the connection between the navigation device and the vehicle occurs via a docking device, connected to the vehicle and adapted to receive the navigation device.

44. The navigation device of claim 40, wherein the detecting includes detecting a connection between the navigation device and the vehicle via a docking device, connected to the vehicle and adapted to receive the navigation device.

45. The navigation device of claim 41, wherein the connection is detected upon detecting an electrical connection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

46. The navigation device of claim 42, wherein the connection is detected upon detecting a physical connection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.
47. The navigation device of claim 40, wherein the connection is detected upon detecting a physical connection between the navigation device and a docking device, connected to the vehicle and adapted to receive the navigation device.

48. The navigation device of claim 39, wherein the device to prompt and the display device are integrated.

49. The navigation device of claims 37-48, further comprising:
   a device to detect a condition of the vehicle, indicating a connection between the navigation device and the vehicle, wherein the positional location is stored upon detecting the condition.

50. The navigation device of claim 49, wherein the condition detected includes movement of the vehicle.

51. The navigation device of claim 49, wherein the condition detected using heuristics.

52. The navigation device of claim 49, wherein the condition is detected by software.

53. The navigation device of claim 41, wherein the electrical connection is detected by a sensor.

54. The navigation device of claim 42, wherein the physical connection is detected by a sensor.

55. A method, comprising:
   storing a positional location of a navigation device upon disconnection from a vehicle; and
determining a route to the vehicle based upon a current location of the navigation device and the stored positional location at which the navigation device was disconnected from the vehicle.

56. The method of claim 55, further comprising:
prompting selection of an option to access the positional location at which the navigation device was disconnected from the vehicle, the determining of the route occurring in response to selection of the option.

57. The method of claim 56, further comprising:
displaying the determined route to the vehicle on the navigation device.

58. The method of claims 55-57, further comprising:

detecting a disconnection between the navigation device and the vehicle, wherein the positional location is stored upon detecting the disconnection.

59. The method of claim 58, wherein the disconnection is detected upon detecting an electrical disconnection between the navigation device and the vehicle.

60. The method of claim 58, wherein the disconnection is detected upon detecting a physical disconnection between the navigation device and the vehicle.

61. The method of claims 55-60, wherein the disconnection between the navigation device and the vehicle occurs via a docking device, connected to the vehicle and adapted to receive the navigation device.

62. The method of claim 58, wherein the detecting includes detecting a disconnection between the navigation device and the vehicle via a docking device, connected to the vehicle and adapted to receive the navigation device.
63. The method of claim 59, wherein the disconnection is detected upon detecting an electrical disconnection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

64. The method of claim 60, wherein the disconnection is detected upon detecting a physical disconnection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

65. The method of claim 58, wherein the disconnection is detected upon detecting a physical disconnection between the navigation device and a docking device, connected to the vehicle and adapted to receive the navigation device.

66. A computer readable medium including program segments for, when executed on a processor of a navigation device, causing the navigation device to implement the method of claim 55.

67. A navigation device, comprising:
   means for storing a positional location of the navigation device upon disconnection from a vehicle; and
   means for determining a route to the vehicle based upon a current location of the navigation device and the stored positional location at which a navigation device was last connected to a vehicle.

68. The navigation device of claim 67, further comprising:
   means for prompting selection of an option to access the positional location at which the navigation device was disconnected from the vehicle, the determining of the route occurring in response to selection of the option.

69. The navigation device of claim 68, further comprising:
means for displaying the determined route to the vehicle on the navigation device.

70. The navigation device of claims 67-69, further comprising:
    means for detecting a disconnection between the navigation device and the vehicle, wherein the positional location is stored upon detecting the disconnection.

71. The navigation device of claim 70, wherein the disconnection is detected upon detecting an electrical disconnection between the navigation device and the vehicle.

72. The navigation device of claim 68, wherein the disconnection is detected upon detecting a physical disconnection between the navigation device and the vehicle.

73. The navigation device of claims 67-72, wherein the disconnection between the navigation device and the vehicle occurs via a docking device, connected to the vehicle and adapted to receive the navigation device.

74. The navigation device of claim 68, wherein the detecting includes detecting a disconnection between the navigation device and the vehicle via a docking device, connected to the vehicle and adapted to receive the navigation device.

75. The navigation device of claim 71, wherein the disconnection is detected upon detecting an electrical disconnection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

76. The navigation device of claim 72, wherein the disconnection is detected upon detecting a physical disconnection between the navigation device and the vehicle.
vehicle, via a docking device, connected to the vehicle and adapted to receive
the navigation device.

77. The navigation device of claim 68, wherein the disconnection is detected
upon detecting a physical disconnection between the navigation device and a
docking device, connected to the vehicle and adapted to receive the navigation
device.

78. The navigation device of claim 69, wherein the means for prompting and
the means for displaying are integrated.

79. A navigation device, comprising:
memory to store a positional location of the navigation device upon
disconnection from a vehicle; and
a processor to determine a route to the vehicle based upon a current
location of the navigation device and the stored positional location at which the
navigation device was last connected to the vehicle.

80. The navigation device of claim 79, further comprising:

a device to prompt selection of an option to access the positional location
at which the navigation device was disconnected from the vehicle, the
determining of the route occurring in response to selection of the option.

81. The navigation device of claim 80, further comprising:

a display device to display the determined route to the vehicle on the
navigation device.

82. The navigation device of claims 79-81, wherein the processor is further
used to detect a disconnection between the navigation device and the vehicle,
wherein the positional location is stored upon detecting the disconnection.
83. The navigation device of claim 82, wherein the disconnection is detected upon detecting an electrical disconnection between the navigation device and the vehicle.

84. The navigation device of claim 82, wherein the disconnection is detected upon detecting a physical disconnection between the navigation device and the vehicle.

85. The navigation device of claims 79-84, wherein the disconnection between the navigation device and the vehicle occurs via a docking device, connected to the vehicle and adapted to receive the navigation device.

86. The navigation device of claim 82, wherein the detecting includes detecting a disconnection between the navigation device and the vehicle via a docking device, connected to the vehicle and adapted to receive the navigation device.

87. The navigation device of claim 83, wherein the disconnection is detected upon detecting an electrical disconnection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

88. The navigation device of claim 84, wherein the disconnection is detected upon detecting a physical disconnection between the navigation device and the vehicle, via a docking device, connected to the vehicle and adapted to receive the navigation device.

89. The navigation device of claim 82, wherein the disconnection is detected upon detecting a physical disconnection between the navigation device and a docking device, connected to the vehicle and adapted to receive the navigation device.
90. The navigation device of claim 81, wherein the device to prompt and the display device are integrated.
Fig. 5

Navigatie naar...

GPS-positie
Locatie op de kaart
Latitude
Longitude
Last docked

Terug

510