(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
17 August 2006 (17.08.2006)

PCT

(10) International Publication Number
WO 2006/085740 A1

(51) International Patent Classification:
G01C 21/34 (2006.01)

(21) International Application Number:
PCT/NL2005/000103

(22) International Filing Date:
11 February 2005 (11.02.2005)

(25) Filing Language: English

(26) Publication Language: English

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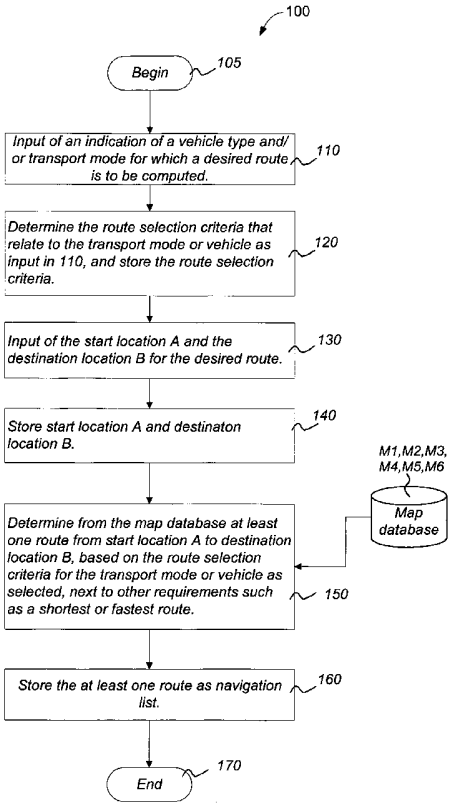
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) Title: METHOD AND DEVICE FOR NAVIGATION



(57) Abstract: A method of navigation comprises a step of selecting route segments from a map database, each of the selected route segments being used for constructing at least one route from a start location to a destination location. The method further comprises the steps of: - receiving a selection signal for one of at least two transport modes or vehicle types; - selecting route selection criteria based on said selection signal for the selected one transport mode or vehicle type, and - evaluating the usability of each selected route segment in the at least one route for the selected one transport mode or vehicle type, by extracting from the map database for each route segment characteristic information as to which transport modes or vehicles are allowed on the route segment.

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Method and device for navigation

Field of the invention

The present invention relates to a method for navigation as defined in the preamble of claim 1. Also, the present invention relates to a navigation device. Moreover, the present invention relates to a computer program.

Prior art

Navigation devices based on GPS (Global Positioning System) are well known and are widely employed as in-car navigation systems. Such a GPS based navigation device relates to a computing device which in a functional connection to an external (or internal) GPS receiver is capable of determining its global position. Moreover, the computing device is capable of determining a route between start and destination addresses, which can be input by a user of the computing device. Typically, the computing device is enabled by software for computing a "best" route between the start and destination address locations from a map database. A "best" route is determined on the basis of predetermined criteria and need not necessarily be the fastest route.

By using positional information derived from the GPS receiver, the computing device can determine at regular intervals its position (typically mounted on the dashboard of a vehicle) and can display the current position of the vehicle to the user Also, it can provide instructions how to navigate the determined route by appropriate navigation signals displayed on a screen and/or generated as audible signals from a speaker (e.g. 'turn left in 100 m'). Graphics depicting the actions to be accomplished (e.g. a left arrow indicating a left turn ahead) can be displayed in a status bar and also be superimposed over the applicable junctions/turnings etc. in the roads shown in the map itself.

It is known to enable in-car navigation systems to allow the driver, whilst driving in a car along a route calculated by the navigation system, to initiate a route re-calculation. This is useful where the vehicle is faced with construction work or heavy congestion.

It is also known to enable a user to choose the kind of route calculation algorithm deployed by the navigation device, selecting for example from a 'Normal' mode and a

'Fast' mode (which calculates the route in the shortest time, but does not explore as many alternative routes as the Normal mode).

It is also known to allow a route to be calculated with user defined criteria; for example, the user may prefer a scenic route to be calculated by the device. The device software would then calculate various routes and weigh more favourably those that include along their route the highest number of points of interest (known as POIs) tagged as being for example of scenic beauty.

In the prior art, the navigation device is limited to applications for route planning and navigation which make use of a map database designed for use in cars. Prior art algorithms for establishing routes and for providing navigation assume that the navigation device is located in or on a car, and that the established route(s) and navigation behavior are to be used for transport by car.

Disadvantageously, a route determined under this assumption may be inaccurate. The navigation device may lead a user on a route which may be passable only with difficulty or may even be inaccessible. For example, a route for a bike from one start location to a destination location and a route for an automobile for the same start and destination location may not be the same, due to restrictions for either type of transport. A bicycle may not use a highway, while a passenger car may not enter a (separate) cycle track.

Summary of the invention

It is an object to provide a method and device for navigation, which overcome the disadvantage from the prior art.

The present invention relates to a method of navigation as defined in the preamble of claim 1, characterised by

- receiving a selection signal for one of at least two transport modes or vehicle types;
- selecting route selection criteria based on said selection signal for the selected one transport mode or vehicle type, and
- evaluating the usability of each selected route segment in the at least one route for the selected one transport mode or vehicle type, by extracting from the map database for each route segment characteristic information as to which transport modes or vehicles are allowed on the route segment.

Advantageously, the method for navigation according to the present invention provides to the navigation device the capability to function in a multi-mode: i.e., a user

is provided with an option to select which transport mode or vehicle is to be used when the route is computed. Using the present invention, for any selected transport mode ranging from driving a car, to riding a bike or walking, a route usable for the selected transport mode can be determined and accordingly, route navigation in relation to the selected transport mode becomes possible.

Moreover, the method provides that the evaluation step determines route selection criteria for the transport mode or vehicle type.

By applying route selection criteria which take into account the transport mode of choice, when a route is determined in a route planning algorithm of a navigation device, it is possible to select only a route which is (better) suited or allowed for a chosen transport mode. The route planning algorithm of the present invention can determine a route from a map database by taking into account, for each location in the map database, transport mode related data.

Such transport mode related data are derived by the method from the map database from indicia in the map database available for each location. The transport mode related data indicate if such a location (as investigated in the route planning algorithm) is usable or accessible for a chosen transport mode.

The present invention also relates to a navigation device as described above, characterised in that the navigation device is arranged for carrying out:

- receiving a selection signal for one of at least two transport modes or vehicles;
- selecting route selection criteria based on said selection signal for the selected one transport mode or vehicle type, and
- evaluating the usability of each selected route segment in the at least one route for the selected one transport mode or vehicle type, by extracting from the map database for each route segment characteristic information as to which transport modes or vehicles are allowed on the route segment..

Also, the present invention relates to a computer program for a navigation device characterised in that the computer program provides the navigation device with a capability for carrying out:

- receiving a selection signal for one of at least two transport modes or vehicles;
- selecting route selection criteria based on said selection signal for the selected one transport mode or vehicle type, and
- evaluating the usability of each selected route segment in the at least one route for the

selected one transport mode or vehicle type, by extracting from the map database for each route segment characteristic information as to which transport modes or vehicles are allowed on the route segment.

Brief description of drawings

The invention will be explained in more detail below with reference to a few drawings in which illustrative embodiments thereof are shown. They are intended exclusively for illustrative purposes and not to restrict the inventive concept, which is defined by the claims and their (technical) equivalents.

Figure 1 shows schematically a navigation device;

Figure 2 shows a flow diagram in accordance with the method of the present invention;

Figure 3 shows schematically a map database arrangement for use in the present invention, and

Figure 4 shows schematically a second map database arrangement for use in the present invention.

Description of preferred embodiment

For the purpose of teaching the invention, preferred embodiments of the method and devices of the invention are described below. It will be appreciated by the person skilled in the art that other alternative and equivalent embodiments of the invention can be conceived and reduced to practice without departing from the concept of the invention, the scope of the invention being limited only by the appended claims.

Figure 1 shows schematically a navigation device.

Navigation device 8 is basically a computer system capable of route planning and navigation as described above. The navigation device 8 comprises host processor 21 with peripherals. The host processor 21 is connected to one or more memory units 18, 19, 22, 23, 24 which store instructions and data, one or more reading units 30 to read, e.g., floppy disks 17a, CD ROM's or DVD's 20, or non-volatile memory containing devices 17b such as Flash-memory cards, memory sticks, etc., input devices 26, and as output devices, a display 28 and an audio output 29.

The input devices 26 may comprise an alphanumerical (or numerical) keyboard, a touch screen or touch pad, a pointer device (e.g., a cross-shaped cursor key), or a trackball. The touch screen may be arranged on the display 28 and may have a virtual keyboard as input device.

The memory units shown comprise RAM 22, (E)EPROM or non-volatile RAM 23, ROM 24, and disk 18. However, it should be understood that there may be provided more and/or other memory units known to persons skilled in the art. Additionally, one or more of them may be physically located remote from the processor 21, if needed.

The processor 21 is shown as one box, however, it may comprise several processing units functioning in parallel or controlled by one main processor. The processing units may be located remotely from one another, as is known to persons skilled in the art, for example in a network topology.

The navigation device 8 is further connected to sensor means 34. The sensor means 34 may comprise one or more of a GPS receiver for receiving GPS signals, an accelerometer (or alternatively a gyroscope) for sensing changes of motion, or any other location sensors.

It is noted that the sensor means 34 may be in a fixed connection with the navigation device 8 or may be detachable from the computer system 8 (e.g., by some dock or connector).

The navigation device 8 may have a wireless I/O connection for connection to a network (33). In case of a connection over a network, the network may be a local area network, wide area network and also may comprise telecommunication networks.

The processor 21 of navigation device 8 is capable of executing software code that implements the method of the present invention.

In use, the memory 18, 22, 23, 24 comprises a map database. In the map database 18, 22, 23, 24 map data, that relate to information on geographical locations, are stored. This will be explained below in more detail.

Figure 2 shows a flow diagram for a route definition procedure 100 to be carried out by the navigation device 8 in accordance with the method of the present invention.

The navigation device 8 is capable of performing a method which allows the construction of a map from the map data in the database and also the construction of a route on that map from one location (start location A) to another location (destination location B).

According to the present invention, in this method the navigation device 8 uses a step of determining which vehicle or transport mode is to be used and, based on this, which route selection criteria to use for route planning/navigation in dependency on the vehicle/transport mode as used.

In a first step 105, the procedure begins. Some initialization may take place.

Next in step 110, the navigation device 8 requests as input (from a user) an indication of a vehicle type and/or transport mode for which a route is to be computed.

The user may be presented with a list of available transport modes or vehicles, from which a selection can be made. The selected type of transport mode or vehicle is stored in memory. Transport modes or vehicle types comprise a car, a truck, a motorcycle, a bicycle, a tricycle, a velorex or a speed-limited car, a moped, a taxi, a walking person, or public transport (e.g., bus, metro, tram, train, aeroplane).

In step 120, after receiving the requested input of a selection signal for the selected transport mode or vehicle, the navigation device 8 determines the route selection criteria that relate to the transport mode or vehicle as entered by the user, and stores the route selection criteria for the desired route in memory 18, 22, 23, 24. The value(s) of the route selection criteria for each transport mode or vehicle may be calculated upon input of the transport mode or may be taken from a list or array of predetermined values.

To construct a route for a particular vehicle type or transport mode, as mentioned above, it is necessary to evaluate if a route is in fact usable for a given vehicle or transport mode.

The route selection criteria can be many.

For cars, such route selection criteria are known from the prior art: "determine shortest or fastest route, obey (car) traffic rules, use any road type allowed for cars, use speed limit on each road type as allowed".

A route for a walking person would be different and use for example the criteria: "shortest route at constant speed (5 km/h), ignore all rules for traffic, exclude motorways and highways (and their parallel ways), use sidewalk or footpath if available".

A route for a bicycle could be "obey bicycle traffic rules, shortest route at speed 20 km/h, use any type of road except motorways and highways, may use one-way streets in a 'wrong direction' but only at walking speed, use bike track if available".

A route for a truck may be similar to that of a passenger car but may have restrictions relating to for example, maximum allowable load for a road, the clearance for a road, allowed passage of tunnels or bridges, or a steepness for road-ramps. Further, some roads may be closed for particular types of cargo such as chemicals or

flammable liquids. Also, legislation may require a truck to maintain a lower speed-limit than for example private cars or a truck may have a speed-control which limits its speed to a predetermined maximum value. This speed may be lower than the general speed-limit allowed for a given road.

Similarly, the navigation device 8 may be capable of determining a route by public transport such a bus or a train. In that case, the route would follow the bus or train route. Such a route may be incorporated in the map database and provide information at which route segments a stop or transfer could be made if required. Other information may relate to travel time or speed of the public transport. Selection criteria may be in this case: "follow shortest or fastest route as provided by public transport system".

For other transport modes or vehicles, other selection criteria may apply as will be appreciated by the skilled person.

Next, in step 130, the navigation device 8 requests as input (from a user) the start location A and the destination location B for the desired route. The start location A and destination location B may be entered in various formats, such as global coordinates, a zip-code, a street address, a phone number, etc. Also, some shortcut notation could be used if a related location was pre-set in memory 18, 22, 23, 24 (for example, one could enter: "home", "work", "school", etc.).

In step 140, after receiving the requested input of the start location A and destination location B, the start and destination locations A and B are stored in machine –readable data in memory 18, 22, 23, 24.

Thus, in step 150, the navigation device 8 determines from the map database a route which extends from start location A to destination location B. The computation of the route is to be based on the aforementioned specific criteria for the transport mode or vehicle as selected, next to other requirements such as a shortest or fastest route, or a route that incorporates a given point-of-interest or way-point.

A route will be built from a series of linked route segments which each are located as an area portion on the map. The map data on a route segment in the map database each comprise characteristic information on an associated geographical location of the route segment. For example, the map data may indicate for a route segment that it relates to a certain class, such as build-on area, open terrain, water area, or a road. Within each class various objects may be defined. The road-class may comprise highway, motorway, city road or country road, footpath and bike track.

Further, the map data of a route segment may comprise information on its relation with neighboring locations: i.e. if a connecting link exists between one route segment and a neighboring one. Such connecting links may be "one-way" or "two-way".

Using the existence of connecting links between route segments in the map, it is possible to construct a route between two geographical locations A and B, as known to persons skilled in the art.

Furthermore, depending on the transport mode or vehicle, a segment of a route may be more or less preferred to use. Therefore, the characteristic information of a route segment can comprise for each transport mode or vehicle type an indication of that route segment's preferability for that transport mode or vehicle.

For example, a road with many curves, although suitable for a truck to drive on, may be less favorable to use for a truck than a relatively straight road. Also, the number of traffic lights on a road, otherwise suitable for a given vehicle type, may make that road be less preferable as part of a route. For a route by bicycle, the presence of a bike track along a road may make that road preferable over a road without a bike track. In this respect, also an indication of a safe speed or speed-limit for a selected vehicle type on a route segment may relate to the preferability of that route segment in a route.

While constructing the route from the map database, the processor 21 carries out a search of route segments and selects searched route segments that may be used in the construction of the route.

Additional to prior art steps for selecting route segments on a map (from the map database) to construct a route from a start location to a destination location, the processor 21 must determine if the route is usable for the selected transport mode or vehicle.

The map data relating to each searched route segment are input in the processor 21 of the navigation device. Characteristic information on class and/or object type is retrieved by the processor from the map data for that route segment.

Next, this characteristic information is compared to the route selection criteria as set up for the given transport mode/vehicle.

If the characteristic information of the map data for a route segment match the selection criteria for the given transport mode/vehicle, that particular route segment is allowable to be incorporated in the route under construction, else that route segment must be omitted from the route.

As described above, also for each route segment the indication of preferability of that route segment for a given transport mode or vehicle may be retrieved by the processor from the map database. The processor may use the preferability information of a route segment next to the information on suitability for its incorporation in a route. Alternatively, the processor may process the preferability information to compute for example an overall preferability value for the route under construction.

The processor 21 of the navigation device 8 will perform step 150 until at least a full route from location A to location B is obtained.

In step 160, after completion of the at least one full route from location A to location B, the at least one full route is stored as navigation list in memory 18, 22, 23, 24 of the navigation device 8.

In step 170, the computation of the route and navigation list ends.

For a given start location and destination location several routes may be possible for a given transport mode or vehicle. If several routes are possible the navigation device may present a choice to the user to select one of them.

The overall preferability value for each constructed route may be used to rank the routes for the user and subsequently to let the user select the route of his choice. Also, the processor of the navigation device may skip routes with a relatively low overall preferability value (compared to some predetermined value).

The map database can be embodied in various ways. Figure 3 shows an embodiment of a map database M1 stored in memory which comprises a series of sub-databases M2, M3, M4, M5. Each sub-database M2, M3, M4, M5 relates to a map for a specific transport mode or vehicle. For example, sub-database M2 relates to a map database for a car, sub-database M3 relates to a map database for a bicycle, sub-database M4 relates to a map database for a truck and sub-database M5 relates to a map database for public transport.

In a further embodiment, the processor 21 of the navigation device 8 chooses upon selection of a transport mode/vehicle, to collect map data from a specific map database for the selected transport mode/vehicle. This advantageously simplifies the construction of a route since all map data in the specific map database already relate to the selected transport mode/vehicle.

Figure 4 shows an alternative embodiment of a map database. The map database M1 may be arranged with map data of route segments which each specify the respective

route segment's suitability in a route for each (implemented) transport mode. For example, the characteristic information of a route segment S1 (with its location symbolically indicated by X1, Y1) may specify to be a city road suitable for various transport modes such as cars, trucks, bicycles and mopeds and also for pedestrians. In relation to each transport mode or vehicle for which the route segment is suitable, the characteristic information may indicate the route segment's specific preferability (for example as a numeric value on a scale from 0 – 100; values shown between parentheses). Another route segment S2 (with its location symbolically indicated by X2, Y2) may specify to be a highway and only be allowed for e.g., cars, trucks, and motorcycles or a specific car type. Other route segments (not shown) may specify otherwise. Note that the map data for each route segment may also provide other information such as connecting paths to other route segments, which is not shown here.

In relation to the characteristic information as stored in the map database the following is noted. Some characteristic information on a route segment may be implicitly known from an object-type (for example, the speed-limit on a route segment of a highway). Other information on a route segment may not be derivable from the object-type and may be explicitly present in the map data for that route segment. To which extent information on a route segment is explicitly or implicitly available, is depending on the content of the map database. It is noted that the processor 21 of the navigation device 8 is capable of using any information as stored in the map database. In case of some implicit information, the algorithm used by the processor may be capable of deriving transport mode related information from the map data in the map database, for example from the class type or the object type of a route segment. Also, some information may not be provided in a map database, for example the information on footpaths or bike track may not be available in a map database. In that case, the selection criteria may present some generalized rules: for example, the selection criteria may define that for pedestrians motorways and highways are excluded, but that city roads and country roads can provide a route for walking.

After compilation of the route and navigation list as described above , the navigation device 8 is ready for carrying out a procedure for route navigation between the locations A and B by using the route and navigation list. This procedure or navigation mode as carried out by the navigation device 8 is similar to navigation procedures known from the prior art (comprising both visual and audible instructions).

However, the speed of motion for a given transport mode/vehicle may strongly differ from one type of transport to another. Therefore, the timing scheme for presenting (and updating) navigation instructions to a user may be set in dependence on the selected transport mode/vehicle (as determined in step 110). The processor of the navigation device 8 uses the information as stored in step 110 and adjusts the timing in accordance with the selected transport mode or vehicle.

Furthermore, while in navigation mode the navigation device 8 is capable of re-computation of a route (or determining an alternative route) when a user follows a wrong way (or when a user requests a re-computation). In the re-computation the navigation device 8 uses the selection criteria as determined in step 120. Basically, the re-computation follows the same lines as presented in step 150, except that the start location now relates to the actual location of the navigation device at the time of re-computation.

In a further embodiment, the navigation device 8 is capable upon re-computation of a route for a given transport mode or vehicle, to re-compute the route for a different transport mode or vehicle (upon input of an instruction by a user).

Additionally, in the step 110 of selecting a transport mode or vehicle, the navigation device 8 may present to a user an option to use a preferred transport mode or vehicle. Such an option for a preferred transport mode or vehicle may be stored in memory. Advantageously, the procedure of having the navigation device 8 compute a route can be simplified when a user for example prefers to use the navigation device only for walking or cycling.

The navigation device 8 can be embodied in various ways: it can be a handheld computing device (or PDA) or a mobile computer equipped with, or connectable to, a GPS location sensor 34 (or any other type of location sensor 34). Also, the navigation device 8 may be a mobile phone, equipped with or connectable to a (GPS) location sensor 34. Next to its telecommunication functions, the mobile phone is capable of carrying out the procedures as described above.

The navigation device 8 may be mountable in/on a any type of vehicle. Advantageously, the multi-mode function of the navigation device 8 can be used in a "mixed" route from A to B which encompasses two or more transport modes. For example, the navigation device 8 can be used during a first route for car navigation by a user to go from one location A to, for example, a parking area. Here, the navigation

device determines the first route in accordance with the selected transport mode, viz. a car. Next, the navigation device can be detached from the car and be used during a second route as a handheld device to, for example, walk from the parking area to a destination B. Again, the navigation device determines the second route in accordance with the selected transport mode, viz. walking.

Also, the navigation device 8 may carry out several alternative routes between one start location A and one destination location B, wherein each of the alternative routes relates to a different transport mode or vehicle. From the alternative routes the user may choose a preferred one.

In yet another embodiment, the navigation device 8 is capable of downloading current information from an information source on the network 33. Such current information may relate to either any map-related or characteristic information. For example, this current information relates to traffic information. This traffic information may be used while determining the route between locations A and B, or during a re-computation as described above. Such traffic information may be specific for a given transport mode/vehicle (for example, traffic jams for cars or delays in public transport systems such as railway or metro) and can therefore be used for determining a route for the given transport mode/vehicle.

It is conceivable in this respect that the map database (or portions thereof) may be downloaded from the network 33.

Also, the present invention may be implemented in a navigation device 8 which has the capability of creating an itinerary (i.e., a list of routes). According to the present invention it is possible that the navigation device for each route on the itinerary computes a route in accordance with a selected (or desired) transport mode or vehicle for that route.

Claims

1. Method of navigation comprising a step of selecting route segments from a map database, each of the selected route segments being used for constructing at least one route from a start location to a destination location,
characterised by
- receiving a selection signal for one of at least two transport modes or vehicle types;
- selecting route selection criteria based on said selection signal for the selected one transport mode or vehicle type, and
- evaluating the usability of each selected route segment in the at least one route for the selected one transport mode or vehicle type, by extracting from the map database for each route segment characteristic information as to which transport modes or vehicles are allowed on the route segment.

2. Method of navigation according to claim 1, wherein said characteristic information comprises information as to which transport modes or vehicles are preferable on the route segment.

3. Method of navigation according to claim 1 or 2, wherein said evaluation step comprises a comparison of the characteristic information of the selected route segment with the route selection criteria related to said selected one transport mode or vehicle type.

4. Method of navigation according to claim 3, wherein the selected route segment is omitted from the at least one route under construction if the comparison reveals that the characteristic information of the selected location and the route selection criteria related to said selected one transport mode or vehicle type do not match.

5. Method of navigation according to any one of the preceding claims, wherein the transport modes or vehicle types comprise at least two of a car, a truck, a bicycle, a tricycle, a moped, a motorcycle, a velorex or a speed-limited car and a pedestrian.

6. Method of navigation according to any one of the preceding claims, wherein the transport modes or vehicle types comprise public transport modes comprising at least one of tram, bus, metro and railway.

7. Method of navigation according to claim 1 wherein the characteristic information relates to either information explicitly stored in the map database or information derivable from a class or object type for the selected route segment.

8. Method of navigation according to any one of the preceding claims, wherein the method comprises a step of downloading current information from an information source in a network (33), the current information being usable as characteristic information.

9. Method of navigation according to any one of the preceding claims, wherein during navigation mode, a timing scheme for presenting instructions to a user is adjustable in dependence of the selection signal for the selected one transport mode or vehicle type.

10. Method of navigation according to any one of the preceding claims, wherein a re-computation step of a route for the selected one transport mode or vehicle comprises the step of selecting the route for an other transport mode or vehicle.

11. Navigation device (8) comprising a processing unit (21) and memory (18, 22, 23, 24), the processing unit being connected to the memory; the navigation device (8) having a connection for receiving location signals from a location sensor (34); the navigation device (8) being arranged for carrying out a step of selecting route segments from a map database (M1; M2, M3, M4, M5; M6) stored in memory (18, 22, 23, 24), each of the selected route segments being used for constructing at least one route from a start location to a destination location characterised in that

the navigation device (8) is arranged for carrying out:

- receiving a selection signal for one of at least two transport modes or vehicles;
- selecting route selection criteria based on said selection signal for the selected

one transport mode or vehicle type, and

- evaluating the usability of each selected route segment in the at least one route for the selected one transport mode or vehicle type, by extracting from the map database for each route segment characteristic information as to which transport modes or vehicles are allowed on the route segment.

12. Computer program to be loaded by a navigation device (8), the navigation device (8) comprising a processing unit (21) and memory (18, 22, 23, 24), the processing unit being connected to the memory; the navigation device (8) being connected to a location sensor (34); the computer program after being loaded providing the navigation device with the capability for carrying out a step of selecting route segments from a map database, each of the selected route segments being used for constructing at least one route from a start location to a destination location, characterised in that

the computer program provides the navigation device (8) with a capability for carrying out:

- receiving a selection signal for one of at least two transport modes or vehicles;
- selecting route selection criteria based on said selection signal for the selected one transport mode or vehicle type, and
- evaluating the usability of each selected route segment in the at least one route for the selected one transport mode or vehicle type, by extracting from the map database for each route segment characteristic information as to which transport modes or vehicles are allowed on the route segment.

13. Data carrier for a computer program in accordance with claim 12.

14. Mobile phone comprising a navigation device (8) according to claim 11.

Fig 1

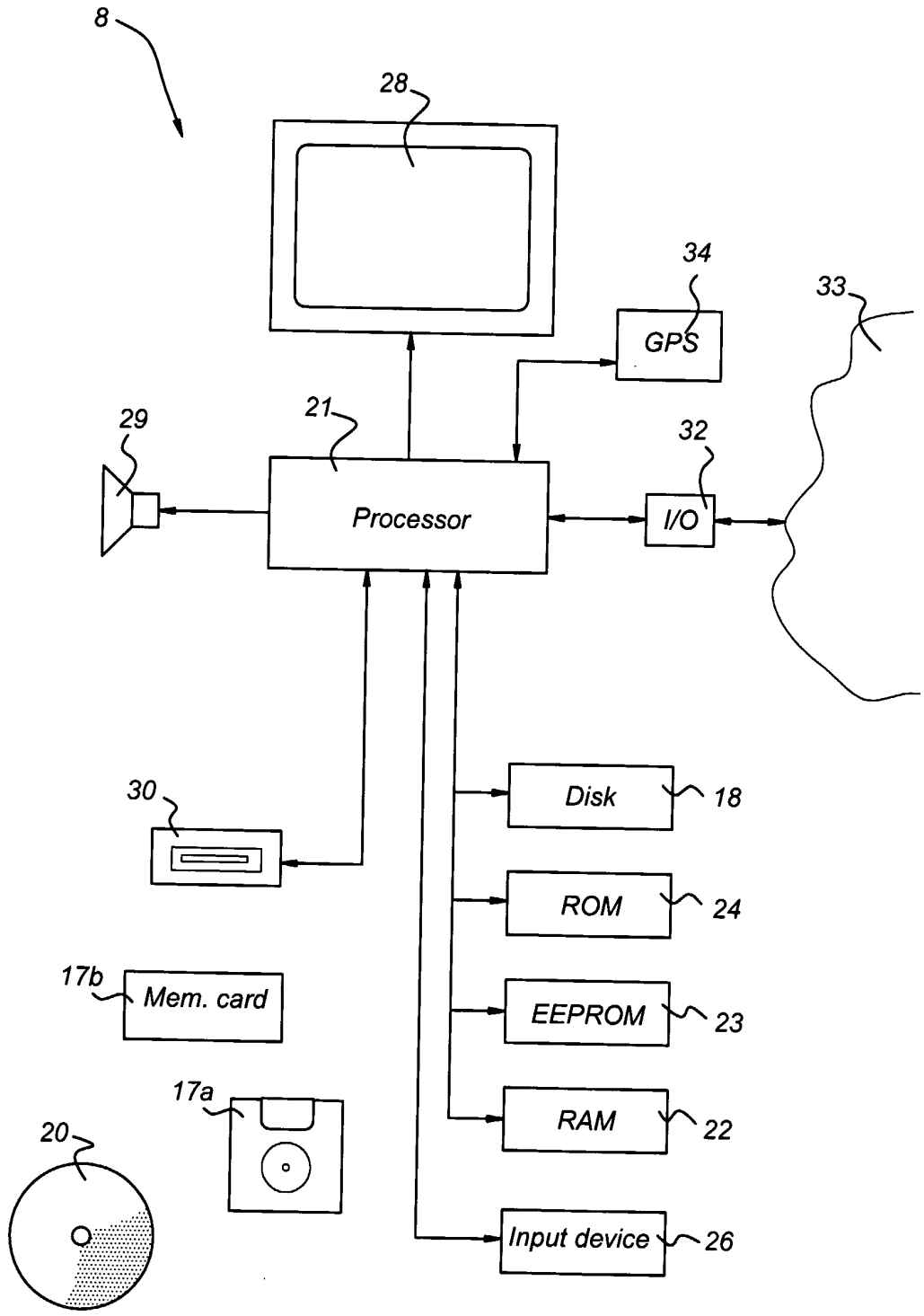

8
28
34
GPS
33
29
21
32
Processor
I/O
30
Disk
18
ROM
24
17b
Mem. card
EEPROM
23
17a
RAM
22
20
Input device
26

Fig 2

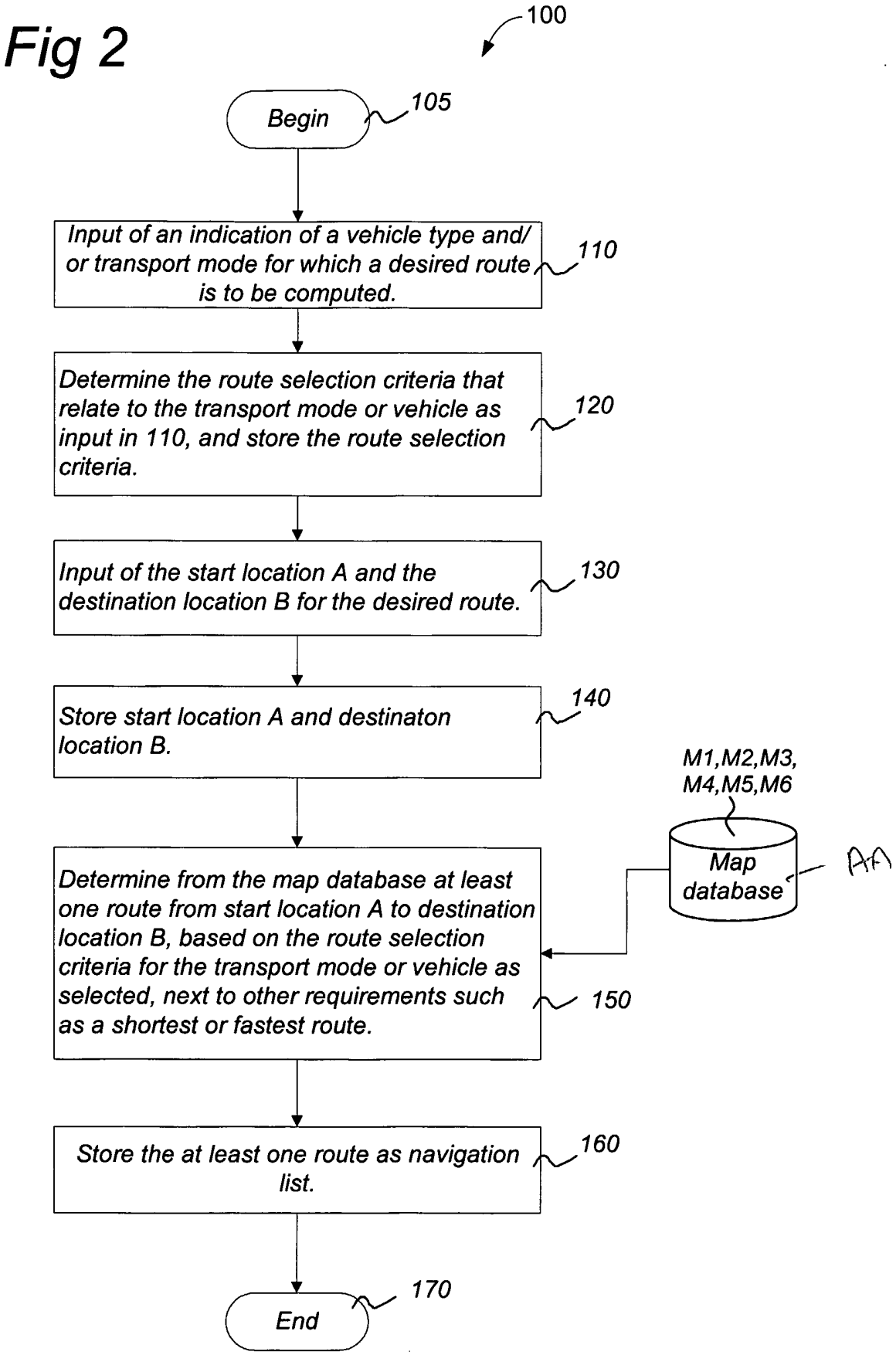

100
Begin
105
Input of an indication of a vehicle type and/ or transport mode for which a desired route is to be computed.
110
Determine the route selection criteria that relate to the transport mode or vehicle as input in 110, and store the route selection criteria.
120
Input of the start location A and the destination location B for the desired route.
130
Store start location A and destinaton location B.
140
M1,M2,M3, M4,M5,M6
Map database
AA
Determine from the map database at least one route from start location A to destination location B, based on the route selection criteria for the transport mode or vehicle as selected, next to other requirements such as a shortest or fastest route.
150
Store the at least one route as navigation list.
160
End
170

Fig 3

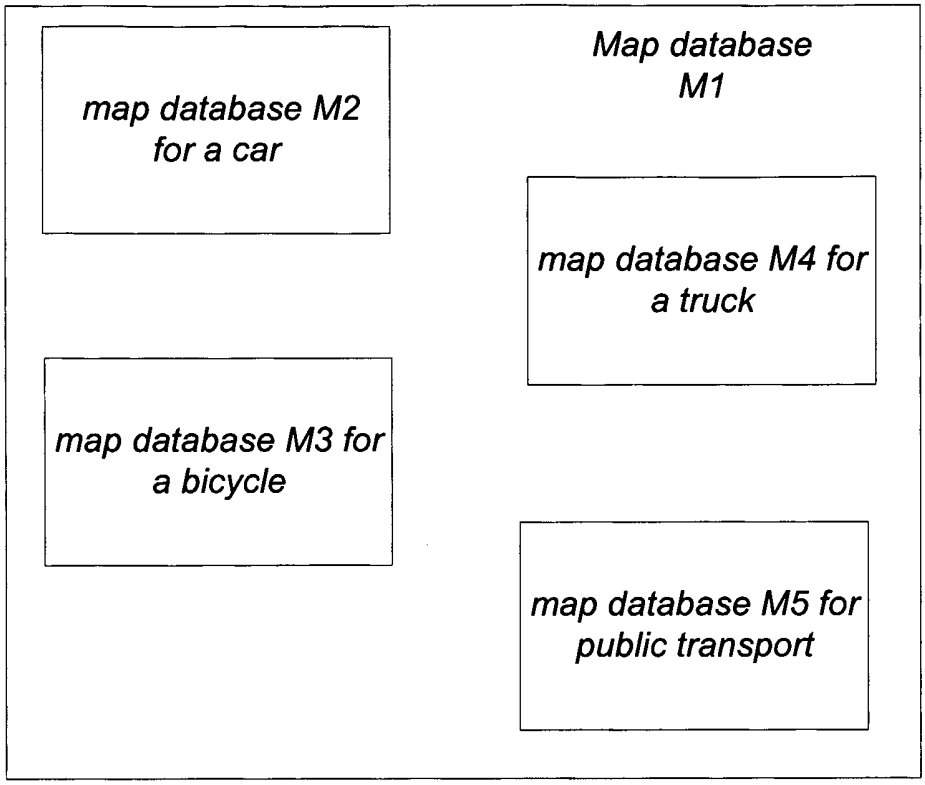
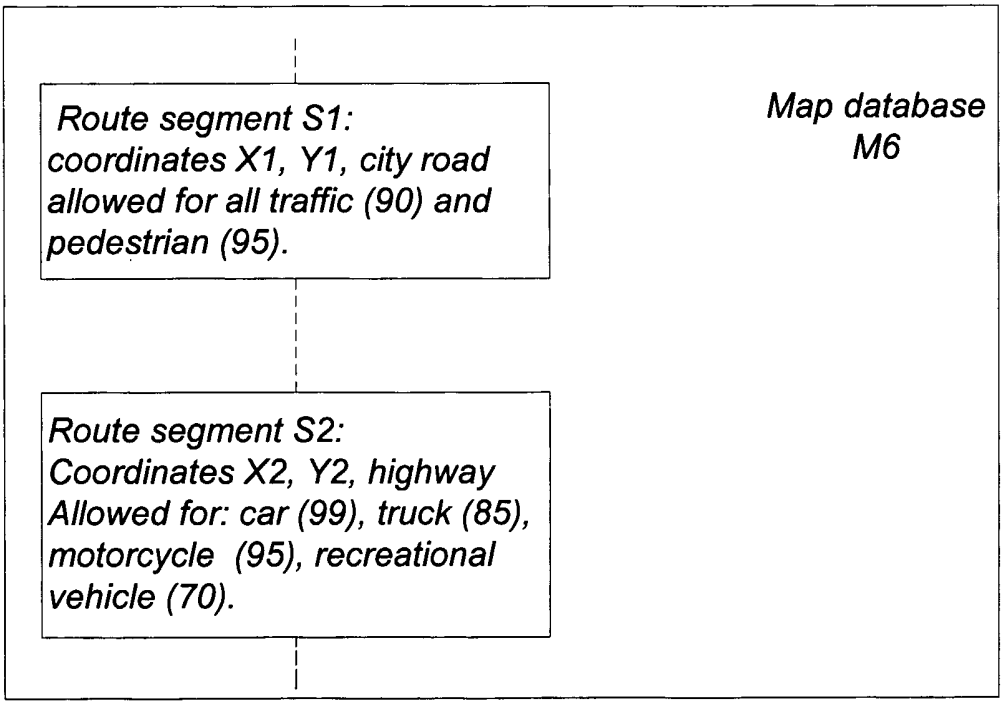

Map database M1
map database M2 for a car
map database M4 for a truck
map database M3 for a bicycle
map database M5 for public transport

Fig 4


Map database M6
Route segment S1: coordinates X1, Y1, city road allowed for all traffic (90) and pedestrian (95).
Route segment S2: Coordinates X2, Y2, highway Allowed for: car (99), truck (85), motorcycle (95), recreational vehicle (70).

INTERNATIONAL SEARCH REPORT

tional Application No
.../NL2005/000103

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01C21/34

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)
IPC 7 G01C

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/027375 A1 (MACHIDA YOSHIYUKI ET AL) 4 October 2001 (2001-10-04) paragraphs '0002!, '0004!, '0005!, '0007!, '0029!, '0031!, '0036!, '0037!, '0048!, '0049!, '0065!; figures 1-3	1,3,5,6, 8,11-13
X Y	US 2001/025222 A1 (BECHTOLSHEIM STEPHAN V ET AL) 27 September 2001 (2001-09-27) abstract; figures 1,5,10 paragraphs '0032!, '0057!, '0082!, '0090!	1,3,5,7, 8,10-14 2
Y	US 2004/158393 A1 (OONISHI KENTA ET AL) 12 August 2004 (2004-08-12) paragraphs '0005! - '0010!; figure 7	2

-/--

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

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 October 2005	25/10/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Hoekstra, F

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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