

DECLARATION OF ACCURACY

I, David Baldwin, declare the following:

1. I am over 18 years of age and competent to make this declaration.
2. I am a qualified Japanese to English translator.
3. I have translated the attached document identified as JPH10-197277.
4. I affirm that the translated text has been translated and edited to the best of my ability and knowledge to accurately reflect the content, meaning, and style of the original text and constitutes in every respect a correct and true translation of the original document.
5. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

I hereby certify under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Dated and signed on August 8, 2019.



(Translator's Signature)

David Baldwin

(Translator's Printed Name)

(51) Int. Cl. ⁶	Ident. Code	FI	
G01C 21/00		G01C 21/00	Z
G08G 1/005		G08G 1/005	
G09B 29/10		G09B 29/10	A
Examination Request: Not Yet		Total No. of Claims: 9 OL (Total 10 pages)	

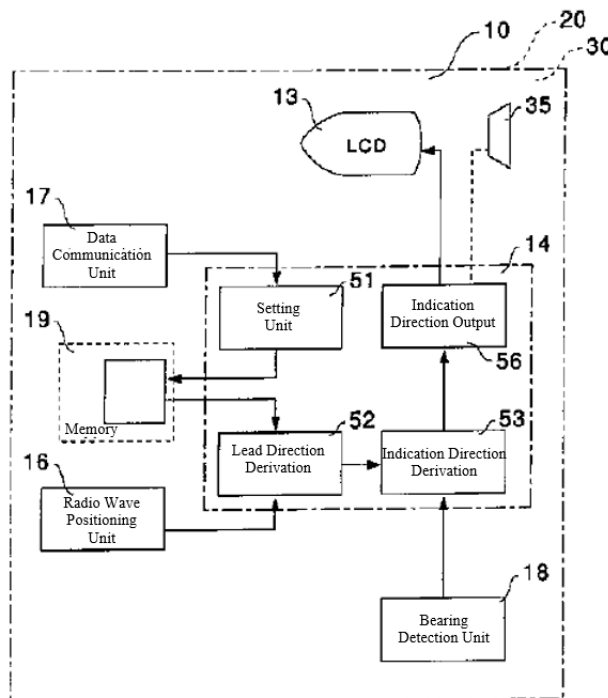
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(54) [Title of Invention] DIRECTION INDICATION DEVICE, DIRECTION INDICATION METHOD, ROAD GUIDANCE SYSTEM, AND ROAD GUIDANCE METHOD

(57) [Abstract]

[Problem] Implementing a miniature and low-cost terminal suitable for navigation for guiding a user to a destination.

[Resolution Means] Providing a radio wave positioning unit 16 for obtaining a first position information showing a current location using GPS; providing a setting unit 51 capable of setting a second position information showing a destination using a service server function via a data communication unit 17; deriving a lead direction showing a direction to the destination from the first and second position information in a lead direction derivation unit 52; and moreover, using a bearing detection unit 18 to detect a direction the LCD 13 is facing. Furthermore, using an indication direction derivation unit 53 to find an indication direction indicating the direction to the destination with respect to the orientation of the user with a relative direction and conveying the direction to the user with an arrow or audio from the indication direction output unit 54. Showing the direction to the destination in this manner without using a large volume of map information enables the construction of a navigation system using a miniature and low-cost user terminal.



[Scope of Patent Claims]

[Claim 1] A direction indication device, comprising:
 positioning means capable of obtaining a first position information showing a current location using radio wave positioning;
 setting means capable of setting a second position information showing a destination;
 bearing detection means capable of grasping a reference bearing of a user;
 means for deriving a lead direction showing a direction to the destination from the current location using the first and second position information; and
 conveyance means for conveying, to the user, an indication direction showing the lead direction with respect to the reference bearing.

[Claim 2] The direction indication device according to claim 1, wherein the conveyance means is display means capable of displaying the indication direction, and the bearing detection means is capable of grasping an orientation of the display means as the reference bearing.

[Claim 3] The direction indication device according to claim 1, wherein the conveyance means is means for conveying the indication direction using audio, and the bearing detection means is capable of grasping an orientation of a body of the user as the reference bearing.

[Claim 4] The direction indication device according to claim 1, further comprising communication means capable of transmitting and receiving data, wherein the setting means is capable of obtaining the second position information via the communication means.

[Claim 5] The direction indication device according to claim 4, wherein the communication means is capable of exchanging the first and second position information with a specific information processing device via a public communication network.

[Claim 6] A direction indication method, comprising:
 a first step for obtaining a first position information showing a current location using radio wave positioning;
 a second step for grasping a reference bearing of a user;
 a third step for deriving a lead direction showing a direction to a destination from the current location using the first position information and a second position information showing the destination; and
 a fourth step for conveying, to the user, an indication direction showing the lead direction with respect to the reference orientation.

[Claim 7] The direction indication method according to claim 6, further comprising a fifth step for obtaining the second position information via a public communication network capable of transmitting and receiving data.

[Claim 8] A road guidance system for performing road guidance to a user terminal capable of grasping a current location using radio wave positioning and showing a direction to a destination with respect to the current location, the road guidance system comprising:

means for setting a final destination of a user;
 means for grasping the current location of the user using a first position information obtained using the radio wave positioning of the user terminal;
 means for deriving a guidance route from the current location to the final destination;

means for deriving a second position information showing a first destination closest to the current location along the guidance route;

means for conveying the second position information to the user terminal; and

means for conveying, to the user terminal, the second position information showing a second destination closest to the first destination when the first position information matches the second position information.

[Claim 9] A road guidance method for performing road guidance to a user terminal capable of grasping a current location using radio wave positioning and showing a direction to a destination with respect to the current location, the road guidance method comprising:

a step for setting a final destination of a user;

a step for grasping the current location of the user using a first position information obtained using the radio wave positioning of the user terminal;

a step for deriving a guidance route from the current location to the final destination;

a step for deriving a second position information showing a first destination closest to the current location along the guidance route;

a step for conveying the second position information to the user terminal; and

a step for conveying, to the user terminal, the second position information showing a second destination closest to the first destination when the first position information matches the second position information.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to a direction indication device and indication method for indicating a movement direction or the like, a road guidance system using the direction indication device, and a road guidance method.

[0002]

[Conventional Art] Several products have been developed to which systems have been applied that are capable of receiving radio waves from a plurality of satellites to detect its own position, and for example, car navigation using a global positioning system (GPS) is used by many users. Using GPS or differential GPS (DGPS), which is corrected using differential information, enables position information such as the latitude, longitude, and altitude expressing a current location to be easily obtained, and a car navigation system matches this position information with road information on a map loaded in a system to be able to indicate a route to a driver.

[0003]

[Problem to be Solved by the Invention]

In recent years, personal navigation systems using GPS other than those loaded in vehicles have been developed, and road guidance using GPS has become possible in fields other than driving. However, personal navigation systems require a display large enough to display a map, and moreover, an external storage medium having a large storage volume such as a CD-ROM must be loaded to accumulate map information in advance. Therefore, it is difficult to miniaturize a personal navigation system, and moreover, they are expensive. Thus, as of yet it has not been possible to provide a navigation system that can be easily used by

[0004] Accordingly, an object of the present invention is to provide a portable terminal whereon a navigation system can be configured that can be miniaturized, made lightweight, and can be easily carried by anyone. Furthermore, an object of the present invention is to provide a road guidance system capable of performing navigation using a portable terminal that can be provided at a low price.

[0005]

[Means for Solving the Problem] Thus, the present invention does not use a map to lead a user to a destination, but provides a direction indication device that can indicate a direction to a destination to lead a user, and using this direction indication device as a terminal enables a personal navigation system to be constructed. Furthermore, when using an arrow display, forward, back, left, and right or the like to show the direction to a destination, bearing detection means such as a gyroscope or electronic compass are used to detect a bearing that will be a reference for the user, namely the orientation of the user or the orientation of the display device, and can be conveyed to the user with relative indication directions that enable a destination to be intuitively understood with visual and auditory senses.

[0006] That is, the direction indication device of the present invention has positioning means capable of obtaining a first position information showing a current location using radio wave positioning; setting means capable of setting a second position information showing a destination; bearing detection means capable of grasping a reference bearing of a user; means for deriving a lead direction showing a direction to the destination from the current location using the first and second position information; and conveyance means for conveying, to the user, an indication direction showing the lead direction with respect to the reference bearing. Furthermore, the direction indication method of the present invention has a first step for obtaining a first position information showing a current location using radio wave positioning; a second step for grasping a reference bearing of a user; a third step for deriving a lead direction showing a direction to a destination from the current location using the first position information and a second position information showing the destination; and a fourth step for conveying, to the user, an indication direction showing the lead direction with respect to the reference orientation.

[0007] It is possible to use display means capable of displaying the indication direction as the conveyance means, and the bearing detection means can grasp the orientation of the display means as the reference bearing, and a display such as an arrow or forward, back, left, and right may be used to show a relative indication direction. Furthermore, it is possible to adopt means for conveying the indication direction using audio as the conveyance means, and in such a case, it is preferable for the bearing detection means to grasp the orientation of the body of the user as the reference bearing. Configuring such that the indication direction can be conveyed using audio enables a movement direction to be suggested to users with visual impairments as well, and furthermore, the movement direction is determined without seeing a display, and thus a safe navigation system can be constructed.

[0008] In the direction indication device and direction indication method of the present invention, it is possible to lead a user to a destination without using map information, and thus the display device can be miniaturized, and furthermore, it is also possible to lead the user with audio. Moreover, there is no need to

unnecessary, enabling terminals to be provided for navigation systems for personal use that can actually be low-cost and mobile. Furthermore, in a conventional navigation system wherein a destination is displayed in map information, the destination is indicated as shown from an aerial view, and thus the user must mentally think of the direction in which to move or must determine the direction in which to move with respect to landmarks such as stores. In contrast, using the direction indication device and direction indication method of the present invention enables a movement direction to be indicated that can be intuitively understood by the user, and thus it is possible to more safely and reliably guide a user to a destination.

[0009] Furthermore, using the direction indication device and the direction indication method of the present invention allows a suitable destination to be set and the direction to the destination to be constantly understood. Thus, it is possible to use as a compass showing specific places other than north and south, and it is possible to use as a device for amusement such as hide and seek or searching games.

[0010] In the direction indication device and direction indication method of the present invention, it is of course possible to manually set the second position information of the destination, but it is also possible to provide communication means capable of transmitting and receiving data and be able to obtain the second position information via the communication means with the setting means. Providing communication means enables, for example, a car navigation system or a home-use desktop computer capable of displaying a map to be used to determine a destination in advance, and the position information thereof can be set in the direction indication device of the present invention in advance. Furthermore, communication means enabling the first and second position information to be exchanged with a specific information processing device via a public communication network, namely a computer communication network such as phone, radio, or internet, enables the second position information showing the destination to be obtained before moving or during moving. For example, it is possible to use a menu display for restaurants or souvenir shops to select a specific shop stored in an information processing device as the destination to obtain the position information of that shop using communication means. In the direction indication device and the direction indication method of the present invention, when the position information of the destination can be obtained, the direction thereof can be constantly indicated, and thus the user can be unerringly lead to the destination. Furthermore, the data exchanged via the communication means is position information such as latitude, longitude, and altitude, and thus the volume of different information such as map information may be small. Therefore, the communication time and expenses for obtaining the destination can also be small.

[0011] Furthermore, the destination can sometimes be obtained from the information processing device, and thus suitable destinations along the route to the final destination can be obtained, and when arriving at these destinations the user is guided to the next destination, and this process enables the user to be guided to a final destination along a predetermined path

without showing map information. That is, it is possible to use the user terminal of the present invention capable of grasping a current location using radio wave positioning and showing a direction to a destination with respect to the current location, and to provide a road guidance system and a road guidance method for performing road guidance to this user terminal. Thus, the road guidance system of the present invention has means for setting a final destination of a user; means for grasping the current location of the user using a first position information obtained using the radio wave positioning of the user terminal; means for deriving a guidance route from the current location to the final destination; means for deriving a second position information showing a first destination closest to the current location along the guidance route; means for conveying the second position information to the user terminal; and means for conveying, to the user terminal, the second position information showing a second destination closest to the first destination when the first position information matches the second position information. Furthermore, the road guidance method of the present invention has a step for setting a final destination of a user; a step for grasping the current location of the user using a first position information obtained using the radio wave positioning of the user terminal; a step for deriving a guidance route from the current location to the final destination; a step for deriving a second position information showing a first destination closest to the current location along the guidance route; a step for conveying the second position information to the user terminal; and a step for conveying, to the user terminal, the second position information showing a second destination closest to the first destination when the first position information matches the second position information.

[0012] In the road guidance system and method of the present invention, the primary information communicated with the user terminal may be position information only. Therefore, there is no need for the road guidance system to be constantly connected to the user terminal, and moreover, the communication time may be short. Furthermore, it is possible to remove all complex operations such as setting a route from the user terminal and perform them on the road guidance system side, and thus the processing time for the user terminal may be short. Also, an appropriate indication direction is conveyed to the user in real time, and thus the user can reliably arrive at the destination in a short amount of time.

[0013] It is possible for the direction indication method and road guidance method of the present invention to be provided as software. It is possible for software provided with the steps of the direction indication method to be an add-on for a mobile information processing terminal and to be supplemented with functions as the direction indication device according to the present invention. Furthermore, operating a software application provided with the steps of the road guidance method of the present invention on a computer with a high processing performance such as a work station enables the road guidance system of the present invention to be provided. Such software can be provided stored on a computer or CPU readable storage medium such as a magnetic disc or ROM, and can be stored on a fixed type hard disc or ROM and loaded as necessary to exhibit the functions thereof.

[0014]

[Embodiments of the Invention] Embodiments of the present invention will be described below with reference to drawings. FIG. 1 illustrates an example configuring a navigation system 1 using a user terminal provided with a direction indication function according to the present invention. This will be described in detail below, but the user terminal provided with the direction indication function according to the present invention can be implemented as a wrist-watch type 10, a wallet type 20, or an earphone type 30, and is configured to receive radio waves from a GPS satellite 2 to obtain position information (first position information), namely, the latitude, longitude, and altitude of its current location. Furthermore, these user terminals 10, 20, and 30 are configured to use a method such as a dialup IP connection to connect to a computer network (internet 3), and to connect to a navigation server (service server) 40 for providing position information (second position information) for the destination via the internet 3.

[0015] FIG. 2 illustrates an outline of a wrist-watch type user terminal 10. The user terminal 10 in the present example is provided with a disk shaped main body 11 and a belt 12 for wearing the main body 11 on an arm 9 of the user, and the main body 11 is provided with a liquid crystal display (LCD) 13 as the display means. The user terminal 10 in the present example is provided with functionality as a wrist-watch, a communication function, or the like in addition to a direction indication function, and is configured to switch between these functions to be used. FIG. 2 illustrates one example of the display on the LCD 13 when the direction indication function is selected, wherein the coordinates (latitude and longitude) of the current location calculated using a GPS function are displayed in an upper portion 13a and the altitude and distance to the destination are displayed in a lower portion 13b. Furthermore, an arrow 5 showing the direction to the destination is displayed in the center 13c of the LCD 13.

[0016] FIG. 3 and FIG. 4 illustrate an outline of the wallet type user terminal 20. The user terminal 20 in the present example is provided with a substantially rectangular housing 21, and an LCD 13 is installed in the center thereof. The user terminal 20 in the present example is a user terminal loaded with various functions such as a communication function or a schedule management function in addition to the direction indication function, and it is configured to switch between these functions or to be operated using multitasking. FIG. 3 and FIG. 4 illustrate a screen for the direction indication function being displayed on the LCD 13, and similar to the wrist-watch type user terminal 10, it displays an arrow 5 showing the direction to the destination in addition to the position information 22 of the current location obtained using the GPS function.

[0017] FIG. 3 and FIG. 4 illustrate a user 8 facing the LCD 13 up and the arrow 5 displayed thereon (FIG. 3) and the user 8 facing the LCD 13 down above his head and the arrow 5 displayed thereon (FIG. 4) at the same position. In the present example, the direction to the destination is diagonally forward and right of the user 8, and the arrow 5 shown in FIG. 3 is in the upper right direction of the housing 21, and the arrow 5

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