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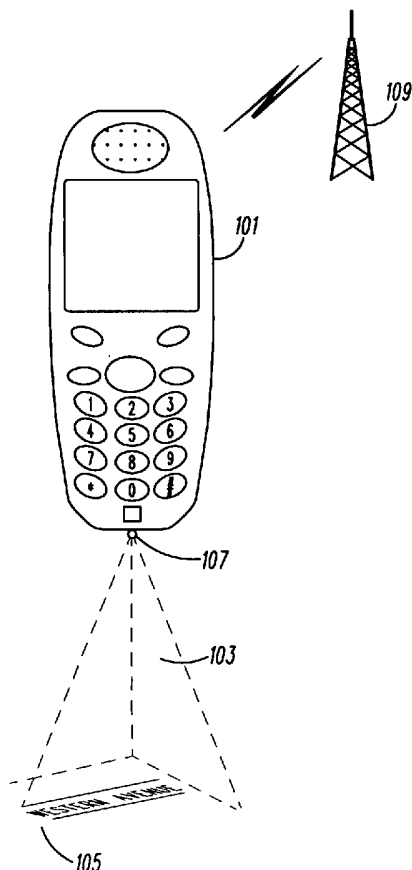
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(54) Title: IN-VEHICLE DISPLAY



(57) Abstract: A system and method for providing digital maps, route guidance instructions, and other useful information routed via a mobile communications device onto a surface of a vehicle is described. Specifically a device (101), preferably a mobile telephone with an embedded projection display means (107) projects information onto one or more surfaces of a vehicle.



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).

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IN-VEHICLE DISPLAY

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Field of the Invention

The present invention relates generally to displays, and more specifically, to projection displays located in vehicles.

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Background of the Invention

Displays in cars today are typically created using Liquid Crystal Displays LCDs which are bulky heavy and expensive – particularly as the size increases. One
15 limitation of these displays is that they are positioned in a fixed location and are generally not moveable. Since they are fixed into a location they have limited flexibility to deliver content. One application is for a pull-down movie screen for rear-seat entertainment. Having an LCD near a passenger's head is dangerous in case of an accident because the passenger's head can hit the relatively heavy glass LCD
20 display screen.

What is needed is an improved display system and method that can selectively display different images on surfaces including lightweight surfaces to be safer in case of an accident.

Brief Description of the Drawings

FIG. 1 is a diagram of a communications device usable in the embodiments described herein;

5 FIG. 2 is a diagram of a system for displaying an image on a surface in a vehicle projected from a mobile communications device in accordance with an embodiment of the invention;

FIG. 3 is a diagram of a display surface in accordance with an embodiment of the invention;

10 FIG. 4 is a diagram of a system for displaying an image on a surface in a vehicle projected from a mobile communications device in accordance with another embodiment of the invention;

FIG. 5 is a diagram of a system for displaying an image on a surface in a vehicle projected from a mobile communications device in accordance with another
15 embodiment of the invention;

FIG. 6 is a pictorial diagram of a position selectable projection display; and

FIG. 7 is a diagram of a system including a mobile telephone with projection display projecting navigation information onto a surface of a vehicle.

Detailed Description of the Preferred Embodiments

In the embodiments that follow a system and method are detailed that provide a user with digital maps, route guidance instructions, and other useful information routed via a mobile communications device onto a surface of a vehicle.

In FIG. 1 a device 101 for providing information is adapted to project a light wave section 103 that terminates on a surface and forms an image 105 depicting the information. Preferably the device is a communications device such as a mobile telephone. The light wave section 103 is emitted from a projection device 107 embedded within the mobile telephone 101. The projection device 107 is preferably constructed using a collimated light source. One adaptation includes a LASER, or several LASERs. Single-mode LASERs are useful in the projection device 107. Since LASERs produce a coherent collimated emission there is substantially no optical power loss when transmitted through air to a diffusing surface. Use of multi-mode LASERs is also possible. One advantage of multi-mode LASERs is the relatively high optical power output compared to single-mode LASERs. Since multi-mode LASERs produce light that is not coherent and not as collimated as a single-mode LASER additional optical elements may need to be inserted in the optical path for optimal results. The communications device 101 is preferably a mobile telephone. This mobile telephone 101 can receive digital map information from an infrastructure system 109. The vehicle operator can either request a specific map or a GPS receiver in the mobile telephone 101 can determine the location of the vehicle and request a map associated with the position determined by the GPS receiver. So effectively the mobile telephone 101, coupled to the infrastructure system 109 forms a map source. Alternate map sources include maps stored locally in a vehicle in a navigation system or other storage and retrieval means.

Referring to FIG. 2 a communications device 101 is removeably captivated by a mounting bracket 201. The removable aspect of this structure is valuable because it allows a driver to use the mobile telephone 101 for projecting information on surfaces outside of the vehicle, and then bringing the mobile telephone 101 into her vehicle to create relatively large-format displays. As mentioned earlier this mobile telephone

101 has the ability to receive digital map, or other relevant information. The mobile telephone 101 projects a light wave section 103 onto a light diffusing surface 203 attached to a conventional rear-view mirror 205. This diffusing surface can be made of plastic or another surface with light diffusing characteristics. FIG. 3 shows a
5 detailed view of the diffusing surface 203 and the mirror 205.

In FIG. 3 the rear-view mirror 205 has a specular surface. As illustrated here the diffusing surface 203 is positioned below the mirror 205. This is a choice out of design convenience as well as an area that a driver is apt to look at comfortably. Route guidance instructions 301 are shown projected from the mobile telephone 101
10 onto the diffusing surface. In this case route guidance instructions are shown but one skilled in the art will readily agree that many other type of useful information can also be displayed. This information may be textual in nature but also graphical. Optionally, the diffusing surface 203 can be positioned in various portions of a vehicle. A distinct advantage of this embodiment is that of creating a relatively large
15 format information display for portraying important driver information on a passive surface. Since a projection approach is used as the diffusing surface 203 is positioned farther away from the projecting mobile telephone 101, the image will get larger because of the diverging nature of the light wave section 103. Using existing, or simple additional surfaces in a vehicle for viewing a display is much safer than using
20 conventional Liquid Crystal Display (LCD) panels when a crash occurs because passengers are less likely to get injured by striking a piece of plastic vs. striking an LCD panel.

Referring to FIG. 4 an embodiment is shown where the mobile telephone 101 projects the light wave section 103 reflecting off of a specular surface 401 forming a
25 redirected light wave section 403 onto another surface – here a dashboard 405. This arrangement is particularly useful for displaying information such a maps onto a surface that is relatively large, and largely unused. As described earlier it doesn't add a large structure that may be unsafe under crash conditions. One advantage of the structure described in FIG. 4 is that the inclusion of the specular surface 401 allows
30 the light wave section 103 to be projected directly out of the bottom of the phone, as opposed to at an angle as shown in FIG. 2. This is beneficial for a user who wants to

remove the mobile telephone 101 from the mounting bracket 201 to be used outside of the vehicle, including use of the projection display capability for projecting an image directly below the mobile telephone 101.

In FIG. 5 another embodiment is shown where the mobile telephone 101 is built
5 into the rear-view mirror 205. This arrangement is principally useful for creating a very compact means for displaying information to a driver with a large display area. The mobile telephone 101, or other communication device, project a light wave section 501 onto the dashboard 405. Here the light wave section 501 is selectable displayable using a switch 505. This function is comparable to a conventional “map
10 light” function in vehicles, except here an actual map can be displayed, rather than a flood light for illuminating a paper map.

Referring to FIG. 6 a refinement of the embodiment shown in FIG. 5 with another useful function, a location switchable display area. Again, a mobile telephone 101 is built into the rear-view mirror 205. An optical switch 601 selectively directs a
15 light wave section to form image on one or more portions of a surface 603, 605. The optical switch 601 preferably is an opto-mechanical device. For example the optical switch may be as simple as a specular surface alternately positionable in more than one orientation for directing the light wave section emitted from the mobile telephone 101. Alternatively the optical switch could be a moveable waveguide. The described
20 structure can be quite useful if a passenger displays a map of interest then moves the map display to a position viewable by a driver. Of course, other information useful to passengers and drivers may be displayed.

The advantage of this embodiment is that a large scale map can be created in a vehicle using a mobile telephone 101 onto a surface in a vehicle.

25 In FIG. 7 a system uses a mobile telephone 701 to project a display of, in this case, navigation information 703. An off-vehicle information center for provides navigation information; for example a route plan from a vehicle’s present position to a destination. This route is based on the vehicle position as determined by a GPS receiver associated with the mobile telephone 701. Of course those skilled in the art
30 will readily recognize basic variants of the teaching herein – such as redirecting the information displayed on the windshield to the dashboard or other convenient surface.

Of course the information displayed could be a game embedded within the telephone 701, a music video, or virtually any other useful information.

Using projection displays in a vehicle is beneficial because the display can be repositioned to various surfaces within the car simply. Moreover, a projection surface
5 can be a lightweight plastic material rather than a glass coated relatively heavy LCD panel and is therefore safer in case of a vehicle accident.

What is claimed is:

1. An in-vehicle system for displaying information on a surface comprising:
5 a device (101) for providing information;
a projection device (107) embedded within the device (101) , the projection device (107) adapted to project a light wave section (103) onto the surface depicting the information.
- 10 2. A system in accordance with claim 2 wherein the projection device (107) comprises a collimated light source.
3. A system in accordance with claim 1 wherein the collimated light source comprises at least one LASER.
- 15 4. A system in accordance with claim 1 wherein the information provided comprises a map.
5. A system in accordance with claim 1 wherein the surface is a
20 windshield.
6. A system in accordance with claim 1 wherein the surface is an interior surface of a vehicle.
- 25 7. A system in accordance with claim 1 further comprising a rear-view mirror (205) for captivating the surface, and wherein the surface is light diffusing.
8. A system in accordance with claim 1 wherein the surface is specular, and wherein the light wave section (103) is redirected onto another surface.

9. A system in accordance with claim 1 wherein the device (101) comprises a mobile telephone adapted to receive said information.

10. A system in accordance with claim 1 further comprising a
5 a switch (505) associated with the projection device (107) for selectively providing the light wave section onto the surface depicting the information.

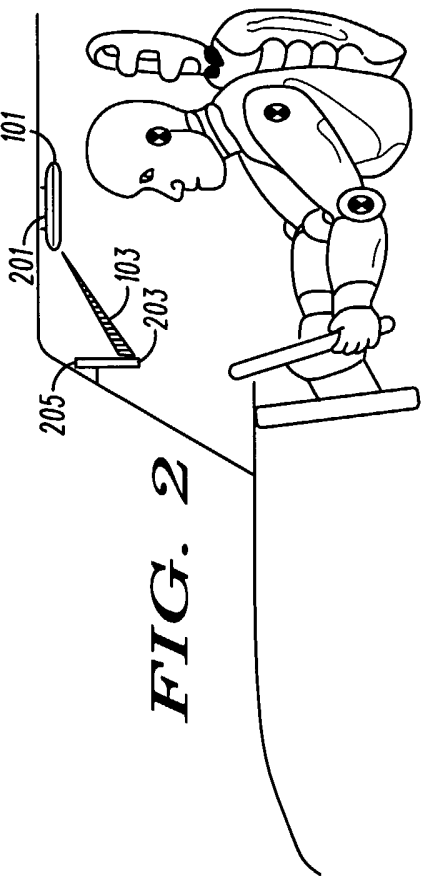
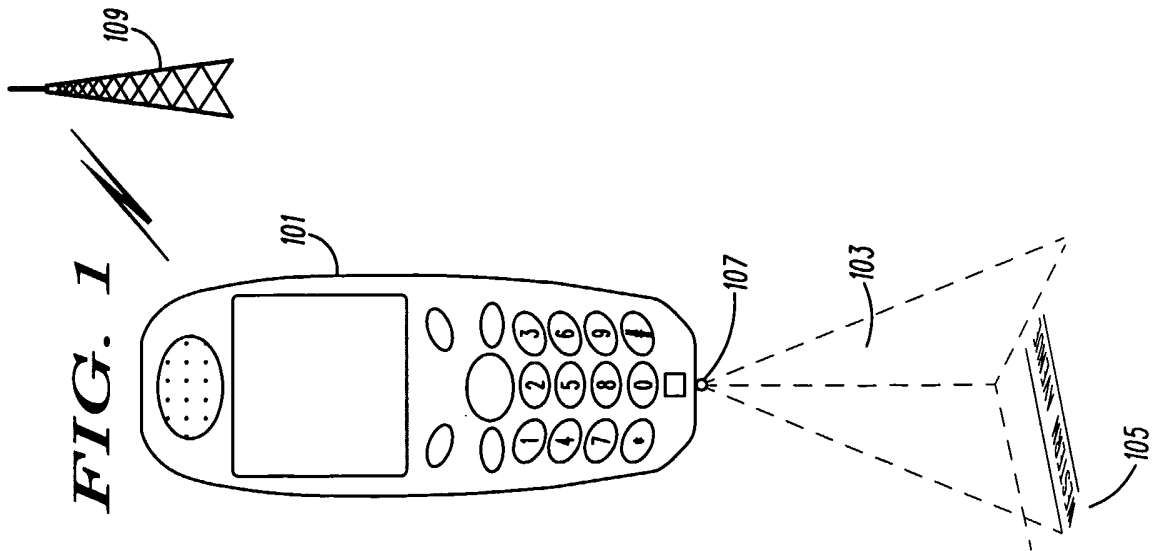
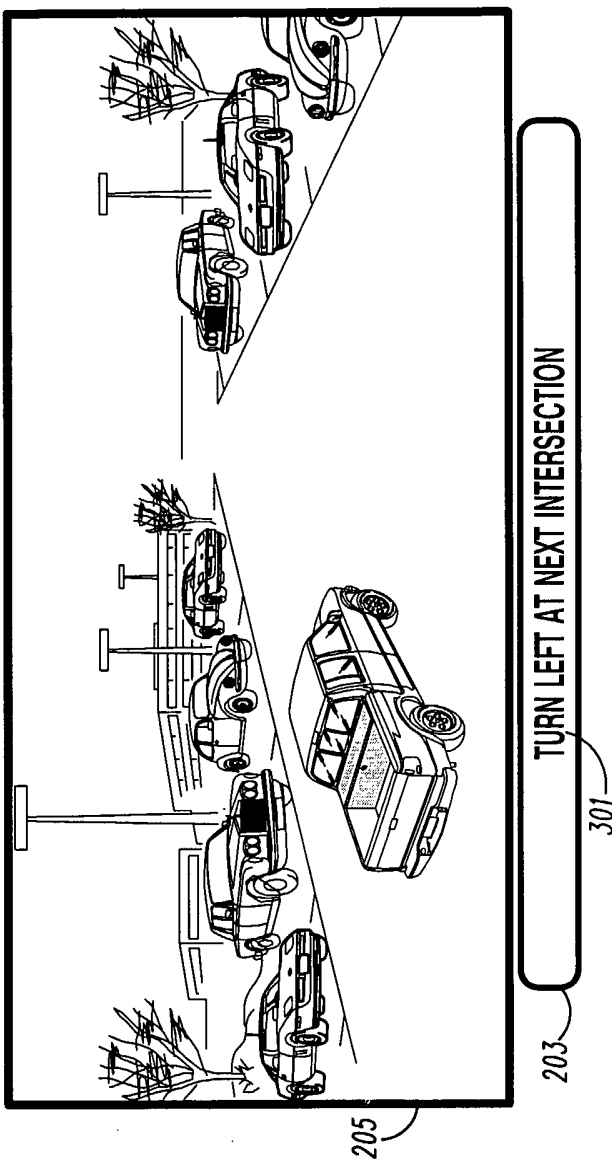


FIG. 3



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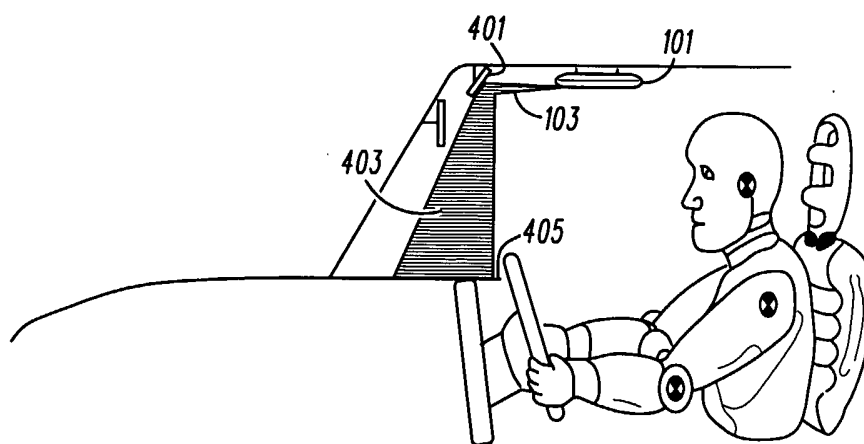


FIG. 4

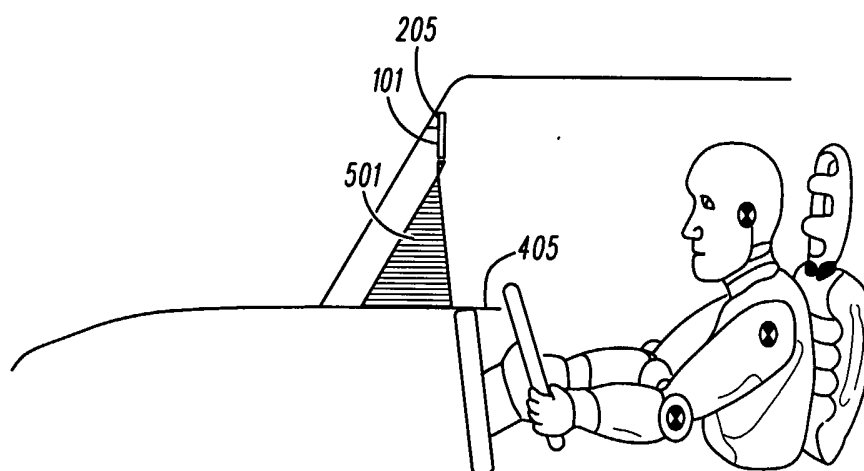


FIG. 5

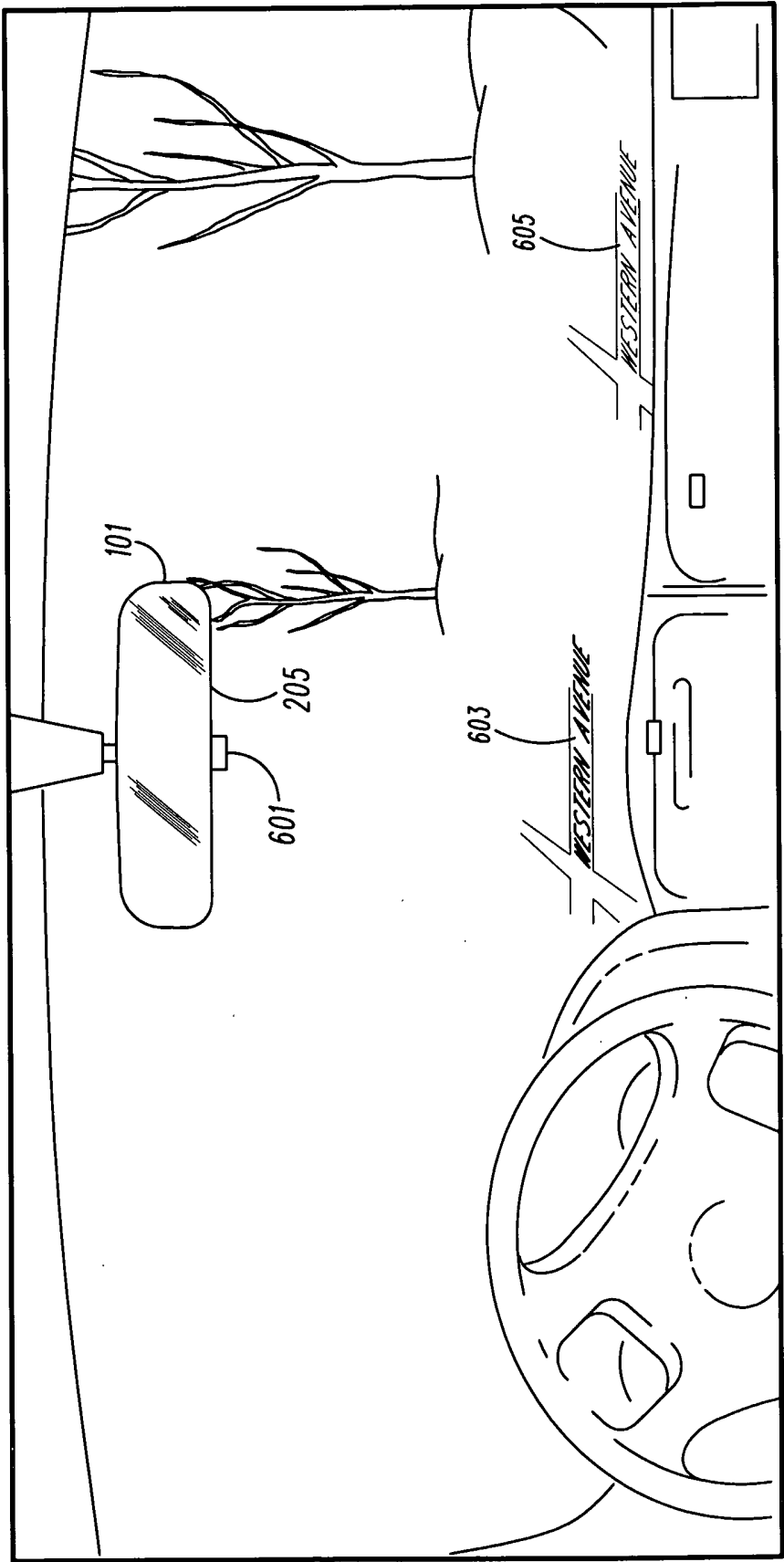


FIG. 6

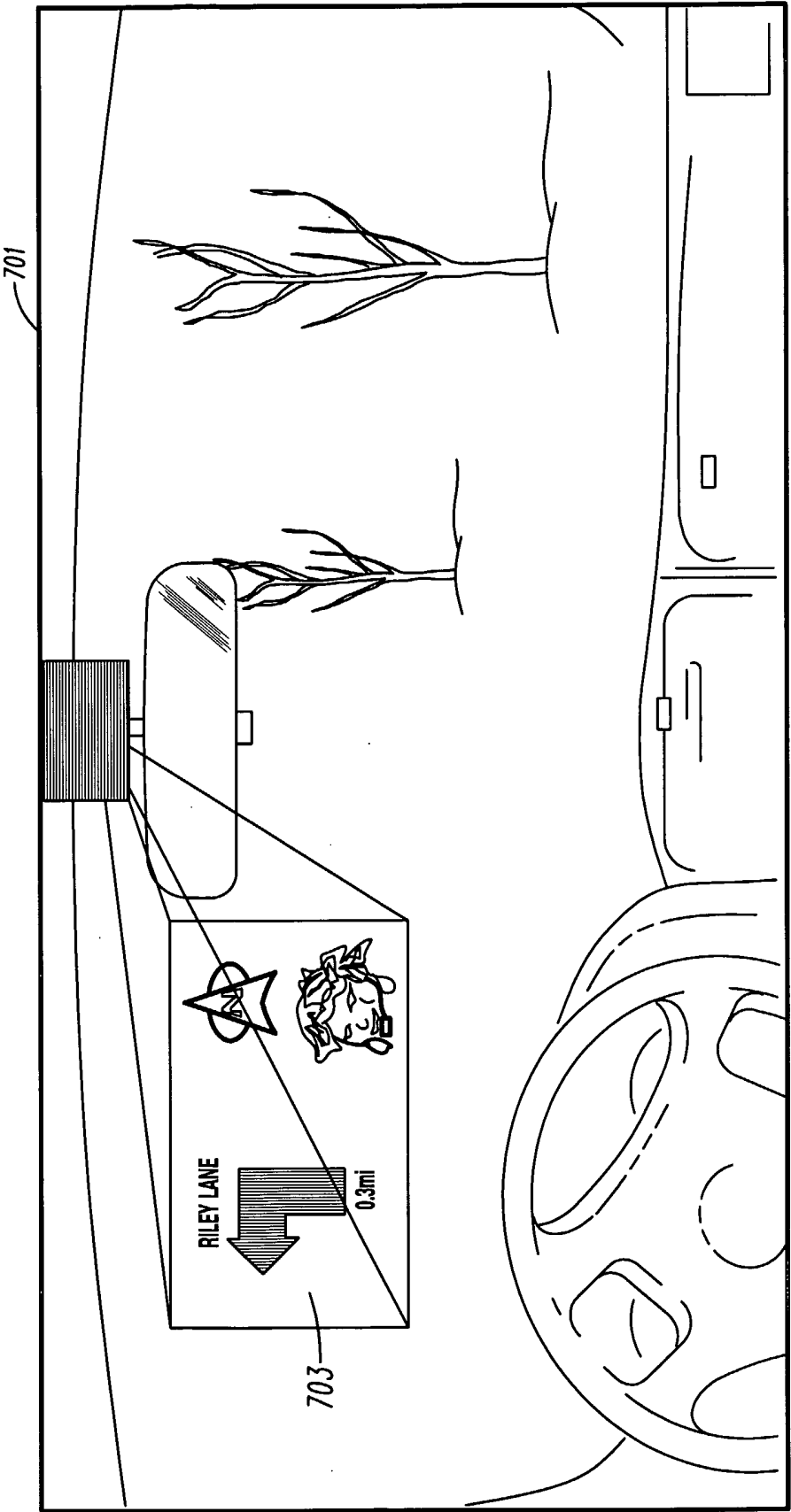


FIG. 7

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04M 1/38

US CL : 455/566; 235/462.45, 462.01, 462.43, 472.01

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)

U.S. : 455/566; 235/462.45, 462.01, 462.43, 472.01

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---	US 2002/0125324 A1 (YAVID et al) 12 September 2002 (12.09.2002), pages 11-13.	1-3, 5-9 -----
Y		4,10
Y	US 2002/0154274 (FURUHATA) 24 October 2002 (24.10.2002), pages 5-7.	4, 10

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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