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(56) Documents Cited:  
**DE 102009018680 A1** **DE 102007042966 A1**  
**US 7375621 B1** **US 20040080404 A1**

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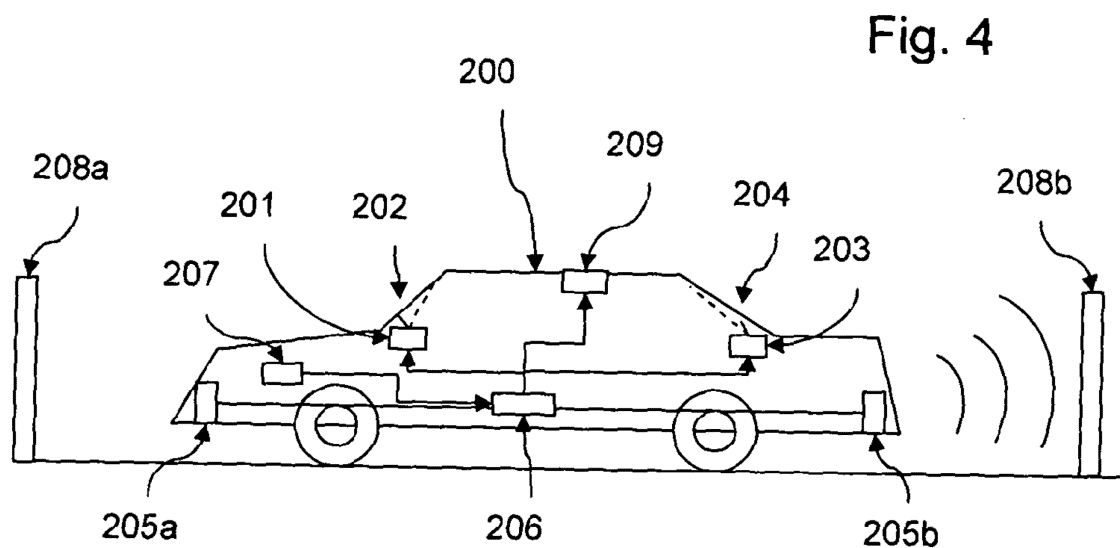
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(58) Field of Search:  
 INT CL **B60Q, G08G**  
 Other: **WPI; EPODOC**

(54) Title of the Invention: **Parking assist system**  
 Abstract Title: **A parking assist system for a motor vehicle**

(57) A parking assist system for a motor vehicle is provided. The system comprises a device for assisting the driver of a vehicle 200 in the process of parking, with sensors 205a, 205b for detecting obstacles 208a, 208b in an environment of the vehicle 200, at least in an environment in front and in back of the vehicle 200; and a display for indicating the distance between the vehicle 200 and an obstacle 208a, 208b identified in the environment. The system is characterized in that the display encompasses a first means 201, with which the distance between the vehicle 200 and an obstacle 208a identified in front of the vehicle 200 can be displayed on a windshield 202 of the vehicle 200, and a second means 203, with which the distance between the vehicle 200 and an obstacle 208b identified in back of the vehicle 200 can be displayed on a rear window 204 of the vehicle 200.



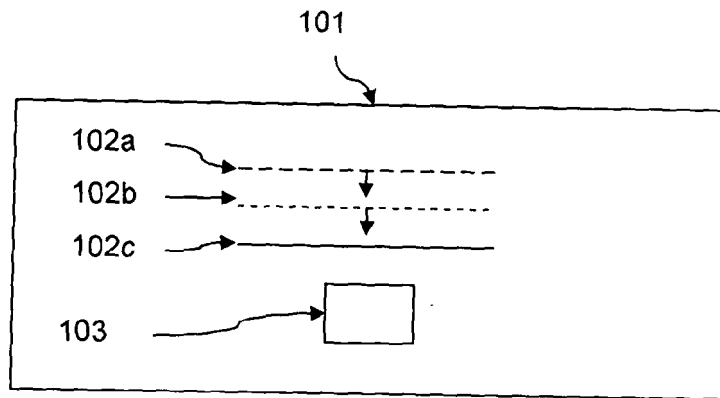


Fig. 1

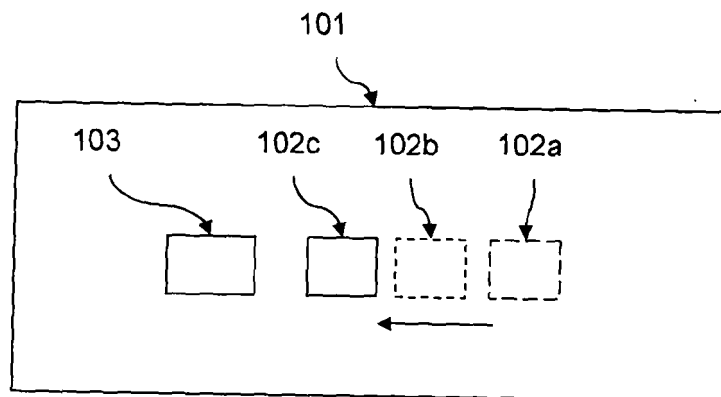


Fig. 2

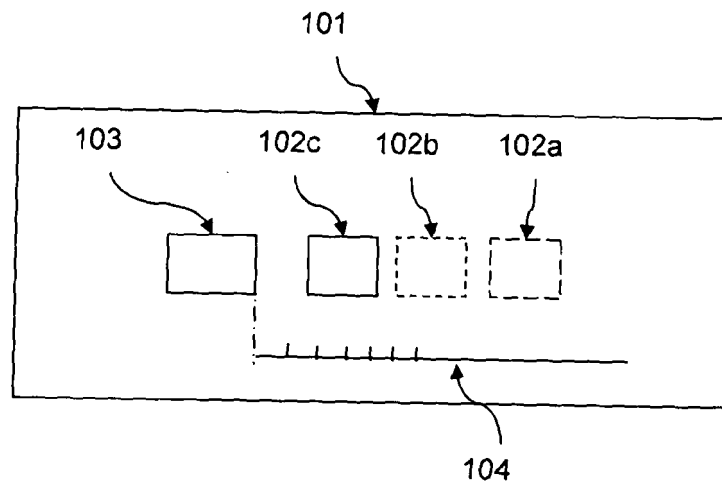


Fig. 3

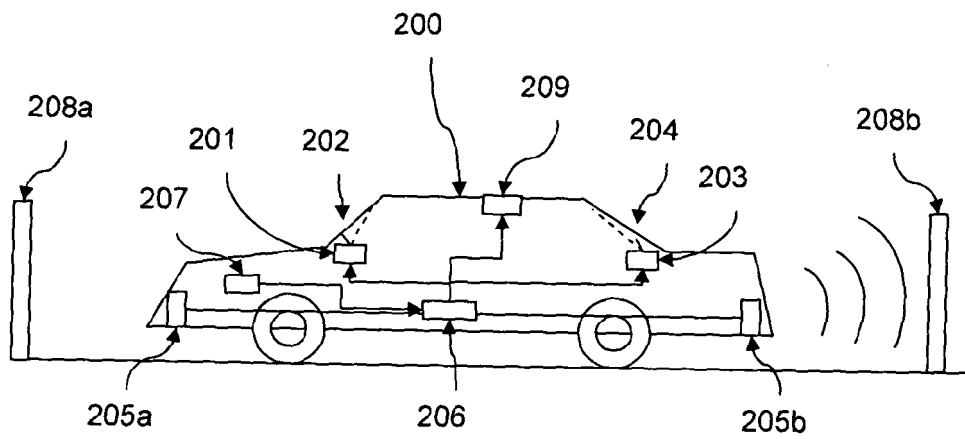
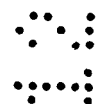


Fig. 4

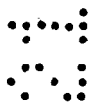
## 5 Parking Assist System

10 The invention relates to a device for assisting the driver of a vehicle, in particular a motor vehicle, in the process of parking. The device encompasses sensors for detecting obstacles in an environment of the vehicle, at least in the environment in front and in back of the vehicle, and a display for indicating the distance between the vehicle and an obstacle identified in the environment.

15 Such a device is known in prior art from publication DE 10 2007 042 966 A1. Described therein is a parking assist system for a motor vehicle, in which the current determined distance between the motor vehicle and an obstacle can be shown on the windshield of the vehicle by means of a head-up display.



20 However, the problem is that the distance from a rear obstacle is also displayed on the windshield in the device from publication DE 10 2007 042 966 A1, so that the vehicle moves in reverse while parking, even though the driver is looking in the opposite direction to scan the information from the head-up display on the windshield of the vehicle.



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The object of the invention is to indicate an improved device for assisting the driver of a vehicle in the process of parking, with which the driver can also directly observe what is going on around the vehicle in terms of traffic.

30 The invention is derived from the features in the independent claims. Advantageous further developments and embodiments are the subject of the dependent claims. Additional features, possible applications and advantages of the invention may be gleaned from the following description, as can an explanation of exemplary embodiments of the invention, which are depicted on the figures.

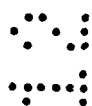
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The object is achieved with a device for assisting the driver of a vehicle in the process of parking, wherein the device has sensors for detecting obstacles in an environment of the vehicle, at least in an environment in front and in back of the vehicle, and a display for

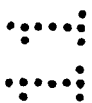
indicating the distance between the vehicle and an obstacle identified in the environment. The device according to the invention is characterized in that the display encompasses a first means with which the distance between the vehicle and an obstacle identified in front of the vehicle can be displayed on/in a windshield of the vehicle, and a  
 5 second means with which the distance between the vehicle and an obstacle identified in back of the vehicle can be displayed on/in a rear window of the vehicle.

The vehicle according to the invention ensures that, while parking, the driver looks in the respective direction that the vehicle is currently moving in the process of parking, during  
 10 which the distance from an obstacle detected by the sensors is displayed at a suitable location on/in the windshield or rear window. The driver directly recognizes and observes the relevant events transpiring around him, and also receives a visual image of the distance from the respective obstacle identified in the current traveling direction in the respective current viewing direction.

15



Let it be noted that the term "in front of the vehicle" or "in back of the vehicle" denotes the area located ahead of the front of the vehicle or behind the tail of the vehicle.



20

An especially advantageous further development of the device according to the invention is characterized in that the first means is designed and set up in such a way that an immovably positioned first symbol representing the vehicle and a second symbol representing the obstacle in front of the vehicle can be displayed on the windshield, wherein a position of the second symbol relative to the first symbol changes as a function of the distance between the vehicle and obstacle, and that the second means is  
 25 designed and set up in such a way that an immovably positioned third symbol representing the vehicle and a fourth symbol representing an obstacle in back of the vehicle can be displayed, wherein a position of the fourth symbol relative to the third symbol changes as a function of the distance between the vehicle and obstacle.



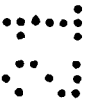
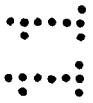
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30 The first and third symbols are preferably identical. They preferably represent a schematic image of the vehicle itself, or of its contours. In the simplest case, the vehicle itself is shown as a line representing the front or tail of the vehicle. Of course, the first and third symbols can be selected from essentially any collection of symbol shapes desired, with preference being given to simple shapes, in particular to symbols that  
 35 intuitively obviously represent the vehicle itself. Of course, the first and third symbols can also differ. The first symbol will preferably only represent the front part of the vehicle itself, while the third symbol preferably represents the tail part of the vehicle. As

described previously, the first and third symbols are shown/displayed immovably positioned on the respective pane (windshield/rear window).

5 In like manner, the second and fourth symbols are preferably identical. They preferably represent a line or contour of the respectively detected obstacle. Of course, the second and fourth symbols can be selected from essentially any collection of symbol shapes, with preference being given to simple shapes, in particular to symbols that intuitively obviously represent the obstacle. Of course, the second and fourth symbols can also differ, in particular in cases where a respective current contour of the respective obstacle  
10 can be displayed, and the obstacles in front and in back of the vehicle differ in terms of their contours.

15 The first means and second means are preferably designed and set up in such a way that, as the vehicle approaches the respective obstacle, the second or fourth symbol moves closer to the immovably positioned first and third symbol shown on the respective panes (windshield/rear window) in a vertical or horizontal direction. This makes it possible to easily and intuitively interpret the distance represented and the change in distance relative to the respective obstacle. It goes without saying that, as the distance from a respective obstacle increases, the second/fourth symbol again moves away from the first/third symbol.  
20



25 Another especially preferred further development of the device according to the invention is characterized in that the first means and second means are designed and set up in such a way that the first/third symbol and/or the second/fourth symbol change in (symbol) shape and/or color as a function of the distance from the respective obstacle. This makes it possible to code various cautionary areas or spaces relative to the respective obstacle, for example a normal maneuvering area (green), a cautionary area (yellow), and a danger area (red), which each require that the vehicle be driven with the appropriate care to avoid colliding with the respective obstacle.  
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In an especially preferred manner, a scale and/or numerical distance value are additionally displayed on the respective pane, so that the driver can also scan the current distance from a respective obstacle graphically or as a numerical value.

35 A preferred further development of the device according to the invention is characterized in that the first means and second means are optical projectors, in particular head-up displays, with which the respective symbols can be projected onto the windshield/rear window. An alternative further development of the device according to the invention is

characterized in that the first means encompasses light-emitting diodes integrated into the windshield, and the second means encompasses light emitting diodes integrated into the rear window, wherein the respective symbols can be displayed via the light-emitting diodes. These light-emitting diodes are preferably designed in such a way as not to  
5 impede vision in any way, i.e., not be discernible to the human eye as foreign objects in the pane.

Another preferred further development of the device according to the invention is characterized in that acoustic signaling means are present, with which acoustic signals  
10 can be generated as a function of the distance from an identified obstacle. The acoustic signals can be individual tones (beeps), the transmission frequency of which increases as the distance from an obstacle decreases. In another preferred embodiment, the acoustic signals are individual tones, the audio frequency of which becomes higher as the distance from an obstacle decreases.

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Another preferred further development of the device according to the invention is characterized in that the first means and second means are designed and set up in such a way that the first means is only activated if the vehicle has been put into first gear, and the second means is only activated if the vehicle has been put into reverse. This ensures  
20 that the parking assist system will only be active when needed.

20



The object is also achieved by means of a vehicle equipped with a device of the kind described above.

25 Additional advantages, features and details may be gleaned from the following description, which describes exemplary embodiments in detail, making reference to the drawings. Described and/or graphically depicted features constitute the subject matter of the invention taken separately or in any sensible combination, even independently of the claims, and can in particular be the subject matter of one or more separate  
30 application(s). The same, similar or functionally identical parts are provided with the same reference numbers.

Shown on:

35 Fig. 1 is a schematized view of a distance displayed on the windshield of a vehicle according to a first embodiment,

Fig. 2 is a schematized view of a distance displayed on the rear window of a vehicle according to a second embodiment,

Fig. 3 is a schematized view of a distance displayed on the rear window of a vehicle according to a third embodiment,

Fig. 4 is a schematized view of a device according to the invention integrated into a vehicle.

Fig. 1 shows a schematized view of a distance displayed on a windshield 202 of a vehicle 200 by means of a device according to the invention for assisting a driver in the process of parking. The first means 201 is here designed and set up in such a way that an immovably positioned rectangular symbol 103 representing the vehicle 200 and a linear symbol (102a-c) representing the obstacle 208a in front of the vehicle 200 are displayed on the windshield 202. While the displayed position of the rectangular symbol 103 does not change as the vehicle approaches the obstacle 208a, the linear symbol 102a moves closer to the rectangular symbol 103 vertically from above as the distance from the obstacle 208a decreases. As the linear symbol 102a approaches the rectangular symbol 103, the type and color of the line also changes. Fig. 1 depicts the linear symbol 102a, 102b and 102c for a respectively corresponding three distances between the vehicle and obstacle 208a. The first means 201 is here designed as an optical projector that displays the symbols 102a-c and 103 in the windshield. The windshield 202 is designed as known from prior art for this purpose.

Fig. 2 shows a schematized view of a distance displayed on a rear window 204 of the vehicle 200 by means of a device according to the invention for assisting a driver in the process of parking. The second means 203 is here designed and set up in such a way that an immovably positioned rectangular symbol 103 representing the vehicle 200 and a rectangular symbol (102a-c) representing the obstacle 208b in back of the vehicle 200 are displayed on the rear window 204. While the displayed position of the rectangular symbol 103 does not change as the vehicle approaches the obstacle 208b, the rectangular symbol 102a moves closer to the rectangular symbol 103 horizontally from the right as the distance from the obstacle 208a decreases. As the rectangular symbol 102a approaches the rectangular symbol 103, the type and color of the line also changes. Fig. 2 depicts the rectangular symbol 102a, 102b and 102c for a respectively corresponding three distances between the vehicle and obstacle 208b. The second means 203 is here designed as an optical projector that displays the symbols 102a-c and 103 in the rear window. The rear window 204 is designed as known from prior art for this purpose.

Fig. 3 differs from Fig. 2 only in that a map scale bar is additionally projected in the rear window 204, so that the driver can scan the distance from the obstacle 208b, for example in centimeters. The current distance value is preferably also displayed numerically.

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Fig. 4 shows a schematized view of a device according to the invention integrated into a vehicle 200. The device encompasses sensors 205a, 205b for detecting obstacles 208a, 208b in an environment in front and in back of the vehicle 200, and a display means for displaying a distance between the vehicle 200 and an obstacle 208a, 208b identified in the environment. The display means further encompasses a first means 201, with which the distance between the vehicle 200 and an obstacle 208a identified in front of the vehicle 200 can be displayed on a windshield 202 of the vehicle 200, and a second means 203, with which the distance between the vehicle 200 and an obstacle 208b identified in back of the vehicle 200 can be displayed on a rear window 204 of the vehicle 200. The first and second means are here each designed as head-up displays, i.e., as optical projectors. The device also encompasses a controller 206 which, as evident from the connecting lines, is connected with the first means 210, the second means 203, the sensors 205a, 205b, a transmission sensor 207 that determines the currently engaged gear, and an acoustic signaling means 209, with which acoustic signals can be generated as a function of the distance from an identified obstacle 208b. The first means 201 and second means 203 are here designed and set up in such a way that the first means 201 is only activated if the vehicle 200 has been put into first gear, and the second means 203 is only activated if the vehicle 200 has been put into reverse. These states are detected by the transmission sensor 207. The controller 206 controls the display of the first means 201 and second means 203 as a function of the distance data acquired by the sensors 205a, 205b, and as a function of the state relative to the currently engaged gear detected by the transmission sensor, so that an immovably positioned first symbol 103 representing the vehicle 200 and a second symbol 102a-c representing the obstacle 208a in front of the vehicle 200 can be displayed on the windshield 202, wherein a position of the second symbol 102a-c relative to the first symbol 103 changes as a function of the distance between the vehicle 200 and obstacle 208a, and so that an immovably positioned third symbol 103 representing the vehicle 200 and a fourth symbol 102a-c representing the obstacle 208b in back of the vehicle 200 can be displayed on the rear window 204, wherein a position of the fourth symbol 102a-c relative to the third symbol 103 changes as a function of the distance between the vehicle 200 and obstacle 208b.

## Reference List

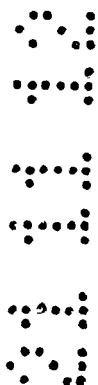
	101	Windshield or rear window
5	102a-c	Movably positioned second/fourth symbol displayable on the windshield/rear window
	103	Immovably positioned first/third symbol displayable on the windshield/rear window
	104	Map scale bar
	200	Vehicle
10	201	First means
	202	Windshield
	203	Second means
	204	Rear window
15	205a	Sensor(s) for detecting an obstacle in an environment in front of the vehicle
	205b	Sensor(s) for detecting an obstacle in an environment in back of the vehicle
	206	Controller
	207	Sensor for detecting the currently engaged gear
20	208a,b	Obstacle
	209	Acoustic signaling means

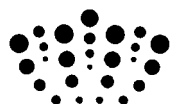
## Claims

1. A device for assisting the driver of a vehicle (200) in the process of parking, with sensors (205a, 205b) for detecting obstacles (208a, 208b) in an environment of the vehicle (200), at least in an environment in front and in back of the vehicle (200), and a display for indicating the distance between the vehicle (200) and an obstacle (208a, 208b) identified in the environment, characterized in that the display encompasses:
- a first means (201), with which the distance between the vehicle (200) and an obstacle (208a) identified in front of the vehicle (200) can be displayed on a windshield (202) of the vehicle (200), and
  - a second means (203), with which the distance between the vehicle (200) and an obstacle (208b) identified in back of the vehicle (200) can be displayed on a rear window (204) of the vehicle (200).
2. The device according to claim 1, characterized in that the first means (201) is designed and set up in such a way that an immovably positioned first symbol (103) representing the vehicle (200) and a second symbol (102a-c) representing the obstacle (208a) in front of the vehicle (200) can be displayed on the windshield (202), wherein a position of the second symbol (102a-c) relative to the first symbol (103) changes as a function of the distance between the vehicle (200) and obstacle (208a), and that the second means (203) is designed and set up in such a way that an immovably positioned third symbol (103) representing the vehicle (200) and a fourth symbol (102a-c) representing an obstacle (208b) in back of the vehicle (200) can be displayed, wherein a position of the fourth symbol (102a-c) relative to the third symbol (103) changes as a function of the distance between the vehicle (200) and obstacle (208b).
3. The device according to claim 1 or 2, characterized in that the first means (201) and second means (203) are optical projectors, in particular head-up displays, with which the respective symbols (103, 102a-c) can be projected onto the windshield/rear window (202, 204).
4. The device according to claim 1 or 2, characterized in that the first means (201) encompasses light-emitting diodes integrated into the windshield (202), and the second means (203) encompasses

light emitting diodes integrated into the rear window (204), wherein the respective symbols (103, 102a-c) can be displayed via the light-emitting diodes.

5. The device according to one of claims 1 to 4,  
5 characterized in that the first means (201) and second means (203) are designed and set up in such a way that the first symbol (103) and third symbol (103) are each represented as a line or contour of the vehicle (200).
6. The device according to one of claims 1 to 5,  
10 characterized in that the first means (201) and second means (203) are designed and set up in such a way that the second symbol (102a-c) and fourth symbol (102a-c) are each represented as a line or contour of the respective obstacle (208a, 208b).
7. The device according to one of claims 1 to 6,  
15 characterized in that the first means (201) and second means (203) are designed and set up in such a way that, as the vehicle (200) approaches the respective obstacle (208a, 208b), the second/fourth symbol (102a-c) moves closer to the immovably positioned first/ third symbol (103) in a vertical or horizontal direction.
8. The device according to one of claims 1 to 7,  
20 characterized in that the first means (201) and second means (203) are designed and set up in such a way that the first/third symbol (103) and/or the second/fourth symbol (102a-c) change in shape and/or color as a function of the distance from the respective obstacle (208a, 208b).
9. The device according to one of claims 1 to 8,  
25 characterized in that an acoustic signaling means (209) is present, with which acoustic signals can be generated as a function of the distance from an identified obstacle (208a, 208b).
10. The device according to one of claims 1 to 9,  
30 characterized in that the first means (201) and second means (203) are designed and set up in such a way that the first means (201) is only activated if the vehicle (200) has been put into first gear, and the second means (203) is only activated if the vehicle (200) has been put into reverse.
11. A vehicle (200) with a device according to one of claims 1 to 10.





**Application No:** GB1219390.0

**Examiner:** Mr Kevin Hewitt

**Claims searched:** 1 to 11

**Date of search:** 14 February 2013

## Patents Act 1977: Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
Y	1,3-5, 7-9, 11	DE 102007042966 A1 (CONTINENTAL AUTOMOTIVE) See especially the WPI Abstract Accession Number 2009-G90578 [27]; and Figures 1 & 2.
Y	1,2-5, 7-9, 11	US 7375621 B1 (HINES) See especially the Abstract, and all Figures.
Y	1,4, 7-9, 11	DE 102009018680 A1 (BAYERISCHE MOTOREN WERKE) See especially the WPI Abstract Accession Number 2010-N51823 [73]; and Figure 1.
Y	1,3,4, 7,11	US 2004/0080404 A1 (WHITE) See especially the Abstract, and Figures 2, 3 & 4.

### Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

Worldwide search of patent documents classified in the following areas of the IPC

B60Q; G08G

The following online and other databases have been used in the preparation of this search report

WPI; EPODOC

### International Classification:

Subclass	Subgroup	Valid From
B60Q	0009/00	01/01/2006
G08G	0001/16	01/01/2006