

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 February 2007 (01.02.2007)

PCT

(10) International Publication Number
WO 2007/013030 A2

(51) International Patent Classification: **Not classified**

(21) International Application Number:
PCT/IB2006/052546

(22) International Filing Date: 25 July 2006 (25.07.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2005/06068 28 July 2005 (28.07.2005) ZA

(71) Applicant and

(72) Inventor: **BEUKES, Hendrik, Johannes** [ZA/ZA]; 373
Polaris Street, Waterkloof Ridge, Extension 3, 0181 Waterkloof (ZA).

(74) Agents: **VAN DER WALT, Louis, Stephanus** et al.;
Adams & Adams, Adams & Adams Place, 1140 Prospect
Street, Hatfield, PO Box 1014, 0001 Pretoria (ZA).

(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, HN, HR, HU, ID, IL, IN, IS, JP,
KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT,
LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA,
NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC,
SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ,
UA, UG, US, UZ, VC, VN, 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, LV, 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).

Declaration under Rule 4.17:

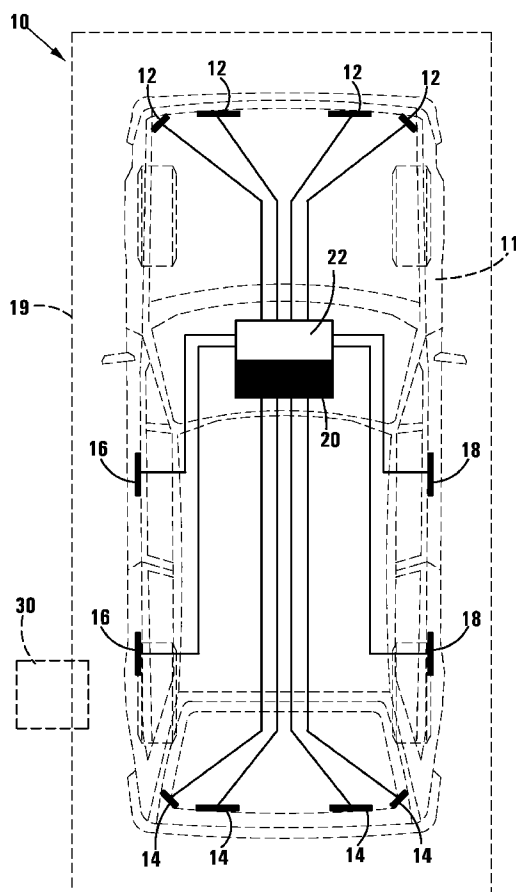
— *as to the identity of the inventor (Rule 4.17(i))*

Published:

— *without international search report and to be republished
upon receipt of that report*

[Continued on next page]

(54) Title: MONITORING SYSTEM



(57) Abstract: The invention relates to a monitoring system, and particularly to a monitoring system to monitor proximity of an object to a vehicle. The monitoring system includes at least one proximity sensor mountable on an exterior of the vehicle and includes triggering means responsive to an ignition switch of the vehicle and operable to activate the proximity sensor when the ignition switch of the vehicle is off. More particularly, the monitoring system may include a plurality of proximity sensors mountable peripherally around the vehicle to provide a monitoring zone around the vehicle.

WO 2007/013030 A2



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

MONITORING SYSTEM

THIS INVENTION relates to a monitoring system, and in particular to a system for monitoring proximity of an object to a vehicle.

5 According to one aspect of the invention, there is provided a monitoring system to monitor proximity of an object to a vehicle, the monitoring system including at least one proximity sensor mountable on an exterior of the vehicle, and triggering means responsive to an ignition switch of the vehicle and operable to activate the proximity sensor when the ignition switch of the vehicle is off.

10 The monitoring system may include a plurality of proximity sensors mountable peripherally around the vehicle to provide a monitoring zone around the vehicle.

15 The term "vehicle" includes any land-, sea-, or air-vehicle, and specifically includes a motor vehicle, such as a freight vehicle or a passenger vehicle (for example a sedan, a SUV, a hatchback, and the like).

20 The monitoring system may be controlled by a processor which is installable in the vehicle. In this regard, the processor may be in the form of a pre-existing on-board computer integral with the vehicle. The monitoring system may further include a machine-readable medium having stored thereon a set of instructions to direct the operation of the processor or the on-board computer.

25 The monitoring system may, in response to the proximity sensors detecting an object in the monitoring zone, generate a warning signal. For example, the warning signal may be in the form of an audible and/or visual warning signal. The warning signal may thus include a visual warning signal that activates lights, for example headlights, hazard lights, or the like, of the vehicle. The monitoring system
30 may further include control means for controlling brightness of the lights as a function of

the proximity of the object to the vehicle. The audible warning signal may include sounding of a horn or siren of the vehicle. The monitoring system may generate the warning signal in response to an object moving into proximity with the vehicle. The object may be another vehicle, a person, or the like.

5

The proximity sensors may be mounted on the vehicle in at least one location selected from the group comprising a front, a rear (which includes a boot door of a hatchback vehicle), sides, door handles, and roof (for example, a sunroof). The system may generate different warning signals in response to objects detected by the front and rear proximity sensors in comparison with warning signals in response to objects detected by the side proximity sensors. In such a case, the warning signal generated in response to objects detected by front and rear proximity sensors may be a function of proximity, while the warning signal generated in response to objects detected by side proximity sensors may be a function of time and proximity. The front and rear proximity sensors may have a range of between 0.3 m and 5.0 m, and the side proximity sensors may have a range of between 0.01 m and 0.5 m.

10

15

20

25

30

The monitoring system may include activation means via which a driver can selectively activate or deactivate individual proximity sensors. The activation means may be provided by buttons, switches, or the like on a vehicle key. Instead, or in addition, the activation means may be integral with the vehicle, for example on a console of the vehicle, or incorporated in an on-board computer of the vehicle. The driver may choose to deactivate a proximity sensor which is proximate a stationary object which would otherwise interfere with the operation of the system, for example a pillar next to where the vehicle is parked. The activation means may also be responsive to conventional unlocking means of the vehicle, such as a remote unlocking transmitter, insertion of the vehicle key in a lock of the vehicle, or the like, to deactivate all the proximity sensors. One or more of the proximity sensors may also be automatically activated only while an ignition switch of the vehicle is on. It is thus to be understood that the system may be selectably activatable and deactivatable at the election of the driver.

The term "driver" is understood to include any person wishing to use the system.

The monitoring system may be powered by a power source independent of a battery of the vehicle. Instead, or in addition, the monitoring system may be powered by the battery of the vehicle.

5

The triggering means may be activated automatically after turning off the ignition of the vehicle. Instead, or in addition, the triggering means may be activated manually by the driver.

10

The proximity sensors of the monitoring system may additionally be operable when the ignition of the vehicle is on.

The invention extends to a vehicle which includes a monitoring system as above defined.

15

According to another aspect of the invention, there is provided a vehicle having a monitoring system to monitor proximity of an object to the vehicle, the system including a plurality of proximity sensors mounted peripherally around the vehicle on a front, a rear, and at least one side door or mudguard, to provide a monitoring zone around the vehicle.

20

The invention will now be further described, by way of example, with reference to the accompanying diagrammatic drawing, which shows a schematic top plan view of a monitoring system, in accordance with the invention, for monitoring proximity of an object to a vehicle.

25

Reference numeral 10 generally indicates a monitoring system, in accordance with the invention, for monitoring proximity of an object to a vehicle 11. The system 10 includes a plurality of proximity sensors 12 to 18 mounted peripherally around the vehicle 11. Four proximity sensors 12 are spaced along a front of the vehicle 11 on a front bumper. Four proximity sensors 14 are spaced along a rear of the vehicle 11 on a rear bumper. Further, two proximity sensors 16 are mounted on a left side of the vehicle 11, one on each left door, while two proximity sensors 18 are mounted on a right side of the vehicle 11, one on each right door. Additional sensors

30

can be mounted where desired, for example on a roof of the vehicle 11 or boot door (especially for hatchback vehicles).

Because the proximity sensors 12 to 18 are spaced roughly uniformly around the vehicle 11, they provide a monitoring zone 19 around the vehicle 11. The front and rear proximity sensors 12 and 14 have a detection range of 0.3 m to 5.0 m, while the side proximity sensors 16 and 18 have a detection range of 0.01 m to 0.5 m. The specifications of the proximity sensors 12 to 18 can be varied as desired.

A simplified version of the system 10 may be provided in which only the front and rear proximity sensors 12 and 14, only the front proximity sensors 12, or only the rear proximity sensors 14, are installed on the vehicle 11 or are active at particular stages of operation of the vehicle.

The proximity sensors 12 to 18 are in electrical communication with an on-board computer 20 of the vehicle 11. The system 10 includes a machine-readable medium (not shown) having stored thereon a set of instructions to direct the operation of the on-board computer 20, and therefore of the system 10. An independent power source 22, in the form of an auxiliary battery, powers the proximity sensors 12 to 18 so that a primary battery (not shown) of the vehicle 11 is not drained.

In use, a driver parks his vehicle 11 in a public parking garage and wishes to leave it there. He turns off the ignition switch of the vehicle 11 in conventional fashion. The on-board computer 20 of the vehicle 11 serves as a triggering means to activate the proximity sensors 12 to 18. He can either manually cause the triggering means to activate the proximity sensors 12 to 18, for example from a button on his vehicle key after he has left the vehicle 11, or the triggering means can be set automatically to activate itself in response to a time period elapsing after the vehicle 11 was locked. The time period can be set by the driver, and in this example is set to 30 seconds.

If an object is proximate the vehicle 11 when the vehicle 11 is parked, this object could set off the system 10, and therefore individual proximity sensors 12 to 18 can be deactivated by the driver depending on the surroundings of the vehicle 11.

In this example, a pillar 30 is adjacent the rear left door of the vehicle 11, and the driver therefore deactivates the proximity sensor 16 on that door. This is conveniently done from activation means in the form of buttons, for example on the vehicle key (not shown). If the vehicle key has standard buttons on it, the on-board computer 20 of the vehicle 11 can be programmed such that these buttons can be used as activation means by the system 10. For example, if one press of a button unlocks the vehicle 11, the on-board computer 20 can be programmed so that two presses of the button deactivates the side sensors 16, 18. Instead, additional buttons may be provided by a separate remote control selectively to activate and/or deactivate individual proximity sensors 12 to 18.

Instead, if a console (not shown) of the vehicle 11 has programmable buttons thereon, the on-board computer 20 of the vehicle 11 can be programmed such that these buttons can be used as activation means by the system 10. The on-board computer 20 could be programmed so that a display means of the console (if present in the vehicle 11) automatically indicates whether or not the sensors 12 to 18 detect an object before the triggering means is activated. In this example, the display means would show that the proximity sensor 16 detects an object (the pillar 30) and would prompt the driver to disable the proximity sensor 16. The driver could respond via the buttons on the console. It is thus to be appreciated that in more sophisticated vehicles, the operation of system 10 may be entirely directed from the console. The on-board computer 20 could even be programmed to allow the driver to adjust the operative ranges of the proximity sensors 12 to 18.

The driver locks the vehicle 11 and leaves. The on-board computer 20, in response to 30 seconds elapsing since the vehicle 11 was locked, activates the proximity sensors 12 to 18.

In a public parking garage environment, a second vehicle (not shown) may well approach the rear of the parked vehicle 11. The proximity sensors 14 detect the second vehicle which at first is still a few metres away. In response to the detection of the relatively distant second vehicle, the system 10 activates the head- and taillights of the parked vehicle 11, via control means (for example the on-board computer 20) such

that the lights shine dimly. As the second vehicle approaches the parked vehicle 11, the system 10 increases the intensity of the lights to warn a driver of the second vehicle that he is getting closer to the parked vehicle 11. When the second vehicle is close to the parked vehicle 11, for example a distance of 0.4 m away, the system 10 sounds the
5 horn of the parked vehicle 11 to draw the attention of the driver of the second vehicle to the close proximity of the two vehicles.

When the second vehicle leaves, the system 10, under control of the on-board computer 20, turns off the lights and horn.

10 The system 10 would react similarly in response to the second vehicle approaching the front proximity sensors 12.

If an object approaches the side of the vehicle 11, that object will typically
15 be a person. The system 10 is set to react differently in response to objects detected at the sides of the vehicle 11 by the side proximity sensors 16 and 18 in comparison with objects detected at the front and rear of the vehicle 11 by the front and rear proximity sensors 12 and 14.

20 The system 10 is set to react to the continued presence of the object at the side of the vehicle 11, as this may suggest that the object is a person, and potentially a thief. If any of the side proximity sensors 16 and 18, which have not been deactivated, detect an object for a user-adjustable duration of time, for example 10 seconds, the system 10 causes the lights to flash and the horn to sound, in an attempt
25 either to ward off the person, or to draw attention of others to his presence.

If the vehicle 11 has connected thereto a tracking device (not shown), the system 10 could, if desired, automatically activate the tracking device in response to a continued presence of the object.

30 The system 10, under control of the on-board computer 20, turns off the lights and horn after 30 seconds to preserve the life of the battery 22. If the object remains in proximity to the vehicle 11, the lights and horn will be activated again in due course, for example after one minute.

The system 10 can be either manually turned off, for example from the activation means, or automatically turned off by the on-board computer 20 when the vehicle 11 is unlocked.

5

If the driver parks the vehicle 11 in a confined space, for example an enclosed garage, he would typically not activate the system 10.

10 The proximity sensors 12 to 18 of the system 10 can additionally be used for conventional parking distance control, if desired, which is appropriate when the ignition of the vehicle 11 is on. It would also be possible to adapt existing proximity sensors used for parking distance control on vehicles to function in accordance with this invention.

15 The inventor believes that the invention as illustrated has the advantage of being an effective monitoring system for a vehicle, being able to warn other drivers of proximate vehicles of a potential collision and being able deter theft of the vehicle by discouraging thieves.

CLAIMS

1. A monitoring system to monitor proximity of an object to a vehicle, the monitoring system including at least one proximity sensor mountable on an exterior of the vehicle, and triggering means responsive to an ignition switch of the vehicle and operable to activate the proximity sensor when the ignition switch of the vehicle is off.

2. A monitoring system as claimed in claim 1, which includes a plurality of proximity sensors mountable peripherally around the vehicle to provide a monitoring zone around the vehicle.

3. A monitoring system as claimed in claim 2, which is controlled by a processor which is installable in the vehicle.

4. A monitoring system as claimed in claim 2, which is controlled by a pre-existing on-board computer integral with the vehicle.

5. A monitoring system as claimed in any one of claims 2 to 4, which, in response to the proximity sensors detecting an object in the monitoring zone, generates a warning signal.

6. A monitoring system as claimed in claim 5, in which the warning signal includes a visual warning signal that activates lights of the vehicle, the monitoring system further including control means for controlling brightness of the lights as a function of the proximity of the object to the vehicle.

7. A monitoring system as claimed in claim 5 or claim 6, in which the proximity sensors are mounted on the vehicle in at least one location selected from the group comprising a front, a rear, sides, door handles, and roof.

8. A monitoring system as claimed in claim 7, in which the warning signal generated in response to objects detected by front and rear proximity sensors is a function of proximity, and in which the warning signal generated in response to objects detected by side proximity sensors is a function of time and proximity.

9. A monitoring system as claimed in claim 7 or claim 8, in which the front and rear proximity sensors have a range of between 0.3 m and 5.0 m, and in which the side proximity sensors have a range of between 0.01 m and 0.5 m.

5

10. A monitoring system as claimed in any one of claims 2 to 9, which includes activation means via which a driver can selectively activate or deactivate individual proximity sensors.

10

11. A monitoring system as claimed in any one of the preceding claims, in which the monitoring system is powered by a power source independent of a battery of the vehicle.

15

12. A monitoring system as claimed in any one of the preceding claims, in which the triggering means is activated automatically after turning off the ignition of the vehicle.

20

13. A monitoring system as claimed in any one of the preceding claims, in which the triggering means is activated manually by a driver.

14. A monitoring system as claimed in any one of the preceding claims, in which the proximity sensor is additionally operable when the ignition switch of the vehicle is on.

25

15. A vehicle which includes a monitoring system as claimed in any one of the preceding claims.

1/1

