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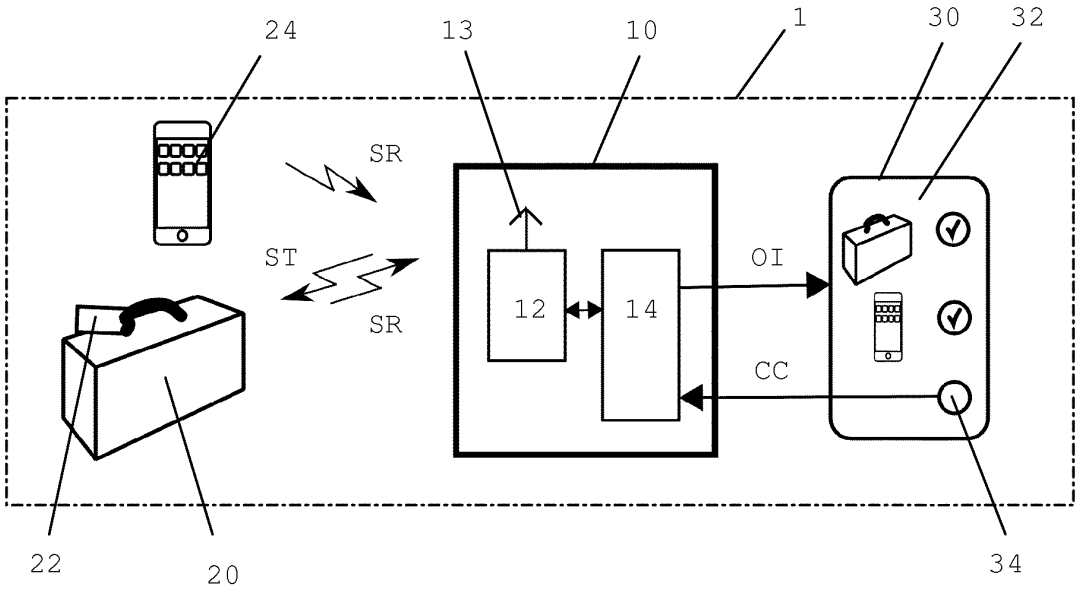
(54) **Method of operating an object detection device of a motor vehicle, object detection device and application program product**

(57) The present invention concerns a method of operating an object detection device (10) of a motor vehicle (1) for indicating information of at least one wirelessly connectable portable object (20, 24). The method comprises the steps of:
- operating the object detection device (10) to receive a wireless signal (SR) from the at least one portable object (20, 24);
- evaluating the received wireless signal (SR) for determining object information (OI) that is indicative of the presence or absence of the at least one portable object (20, 24) in the interior of the motor vehicle (1); and
- presenting the object information (OI) via a user output interface (32) to the user of the object detection device (10).

In this way, the user conveniently obtains a quick overview and confirmation that everything needed is "on board" before he drives away with the motor vehicle for a journey.

Fig. 3



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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a method of operating an object detection device of a motor vehicle and it further relates to an object detection device that is operable according to the method, and to an application program product to be executed on the object detection device or a corresponding remote control device.

BACKGROUND OF THE INVENTION

[0002] Detecting the presence of an object in the interior of a motor vehicle is well known in the prior art. For example, US 2012/0050021 A1 describes a method for detecting an object that has been placed in the rear seating row of the motor vehicle and reminding the driver about the object at the end of the drive cycle.

SUMMARY OF THE INVENTION

[0003] The present invention has the objective to propose an improved method of operating an object detection device of a motor vehicle, and to further propose an improved object detection device, and an improved application program product.

[0004] This objective is met by a method with the features specified in claim 1. An object detection device, a motor vehicle, an application program product and further embodiments of the invention are specified in the further claims.

[0005] The present invention concerns a method of operating an object detection device of a motor vehicle for indicating information of at least one wirelessly connectable portable object. The method comprises the steps of:

- operating the object detection device to receive a wireless signal from the at least one portable object;
- evaluating the received wireless signal for determining object information that is indicative of the presence or absence of the at least one portable object in the interior of the motor vehicle; and
- presenting the object information via a user output interface to the user of the object detection device.

[0006] In this way, the user conveniently obtains a quick overview and confirmation that everything needed is "on board" before he drives away with the motor vehicle for a journey.

[0007] For example, the portable object is a briefcase with an RFID-tag (Radio Frequency Identification) attached thereto. If the user is in doubt about having loaded this RFID-tagged briefcase in his car already, he can easily clarify this situation by operating the object detection device as described above without searching through the car.

[0008] The object detection device or, more precisely, the receiving antenna of the of object detection device, has a surrounding wireless detection range such that the object detection device is able to receive a wireless signal from a portable object, respectively from a tag attached hereto, that is located within this detection range. In an ideal case of undisturbed radiation propagation the wireless detection range may be represented by a volume of a sphere, for example a sphere with a radius substantially limited to the contour or outline of the motor vehicle, e.g. ca. 3 m to 5 m. The detection range may be extended by using a two or more object detection devices or repeaters, for example in case the motor vehicle is a travelling bus.

[0009] The term "portable object" as used in the present invention, is a mobile and independently usable item that is wirelessly connectable to the object detection device. Such a portable object may be any kind of item typically carried on one's way, in particular a valuable and/or important item.

[0010] The term "interior of the vehicle" may or may not include the immediate environment or vicinity of a motor vehicle. For example a portable object in a storage box, which is mounted on top of the roof or at the back of the motor vehicle, may also be regarded as being in the interior of the vehicle.

[0011] The term "object information" mainly indicates the presence or the absence of a portable object. Accordingly, the object information relates to the wireless signal received from the portable object, in particular a signal strength, a frequency, a phase relation, a propagation time or round trip time. Additionally, the object information may also include information associated with and/or stored in the portable object, in particular its identification (ID), security information or further data such as numbers or coded data.

[0012] Surprisingly the method according to the invention is very efficient, reliable and convenient, because the user can easily and instantly check and/or confirm the presence of his portable objects, for example, at the moment before he drives away from a place, e.g. his office or his home. Such a check and/or confirmation can be performed without losing time, even when the user is in a hurry. Thus, under the concept of the present invention, the risk that portable objects are left behind is avoided right at the beginning of the journey.

[0013] Further, the user obtains up-to-date confirmation of his portable objects, which gives confidence and a feeling of security and avoids tedious, unpleasant or embarrassing searches. This is particularly advantageous for handicapped and/or elderly persons or when travelling with children.

[0014] Another example of an advantageous scenario is a family or a travelling group on a journey with numerous travelling items. In this case the method according to the invention provides the confirmation that none of the portable objects is left behind, i.e. a luggage item in a hotel lounge or a mobile telephone, respectively the person carrying the mobile telephone. Thus, the driver of a travelling bus may initiate the system and collect the

identification of all the relevant portable objects at the beginning of a journey and repeat the operation of the object detection device after every break of the journey and/or after an overnight stay in a hotel.

[0015] Even in the case that the object information indicates that one or more portable objects have been left behind, which corresponds to the situation that the portable object is out of the detection range of the object detection device, it often may be possible to fetch the left-behind object before driving away.

[0016] In an embodiment of the invention, the object detection device or a wireless detection unit thereof is operated during a user controlled period of time or a predetermined period of time, in particular during a specified object detection time, further in particular during less than 1 minute or less than 5 seconds. This keeps the operation time of the wireless detection unit and thus the energy consumption at a minimum. This way a particular energy efficient and reliable detection is achieved.

[0017] In one example, the specific time is defined as the time that is recommended by the applicable operation specification of the used wireless technology. In another example, the period of time is controlled in a way that the object detection device emits one or more, in particular a series of bursts.

[0018] In a further embodiment of the method according to the invention, the step of operating the wireless detection unit comprises using a user-controlled amount of energy and/or an amount of energy allocated in dependency of the received wireless signal, further in particular by emitting a wireless signal with a controlled strength and/or during a controlled period of time. This way, energy consumption dynamically takes into account the actual situation.

[0019] In one example, the available amount of energy for signal transmission and/or signal processing is increased if the intensity of the received wireless signal is weak in order to resolve ambiguities and to obtain a reliable detection. The amount of energy may be decreased if all the portable objects are near the object detection device.

[0020] Further, the control of energy consumption allows allocating a large amount of energy for detecting the portable object, in particular for energizing the RFID tag and/or receiving the RFID signal. Thus, by emitting the RFID energizing signal at a high power level and/or using a powerful reception algorithm, a reliable detection of the portable object is possible even if the portable object is badly positioned, e.g. covered by other objects or hidden behind radiation obstacles.

[0021] In one example, the method comprises the step of storing the received wireless signal and substantially deactivating the wireless detection unit after the receiving of the wireless signal, in particular before the step of evaluating the received wireless signal. This achieves a particularly energy efficient operation.

[0022] In a further embodiment of the invention, the method comprises the step of receiving a user control command and thereupon performing the step of operating the object detection device, in particular receiving the user control command from a user input interface of the motor vehicle and/or from a user input interface of a remote control device, further in particular from a touch-screen device used for presenting the object information. In this way, up-to-date object information is obtained instantly on demand precisely when needed. In addition, a very energy efficient operation is achieved, because the wireless detection unit is only activated on user request, i.e. when the object information is actually needed. This avoids energy consumption for determining unused object information.

[0023] In one example, the user input interface of the motor vehicle is built-in, for example as a push-button or a touch-screen device at or in the dashboard of the vehicle.

[0024] In another example, the remote control device, e.g. a mobile telephone, is wirelessly connected to the object detection device for transmitting the user control command to the object detection device. In one example, the remote control device is wirelessly connectable to the object detection device via a local wireless communication connection (LAN), in particular via a Bluetooth, a WLAN or a ZigBee connection.

[0025] Further, the user may reconfirm the presence of a portable object by reissuing the user control command and hence demand refreshing the object information at anytime. For example after having walked or driven away from the motor vehicle a few meters, typically within one or two seconds, the user may request an updated confirmation that the portable object is still within the RFID detection range of the wireless detection unit.

[0026] In a further embodiment of the method according to the previous embodiment, the receiving of the user control command comprises detecting a user initiated event, in particular an occurrence of at least one of:

- a manipulation, in particular an actuation of a button or a touching action on a touch-sensitive area of a touch screen device,
- an acoustic signal, in particular a spoken command, and
- a movement of the user, in particular a gesture.

[0027] The term "touch" is understood as operational interaction. Thus, the touching includes an actual physical contact as well as a close proximity sufficient to trigger an action. For example, a capacitive coupling over a certain distance is also regarded as touching in the sense of the invention.

[0028] In one example, the user control command is a spoken word or a sequence of words, for example "everything on board?". Such a spoken command is particularly convenient, because no free hands are needed.

[0029] In a further embodiment of the method according to the invention, the step of operating a object detection device comprises receiving an RFID signal (Radio

Frequency Identification) from an RFID tag that is attached to the at least one portable object, wherein in particular the RFID tag is a passive RFID tag and the step of operating the object detection device comprises sending an RFID energizing signal to the RFID tag for energizing the RFID tag.

[0030] A passive RFID tag, which has no internal power supply, needs to be energized by an external power source, i.e. by the electromagnetic radiation energy received via its antenna in order to start operating. The passive RFID tag is very convenient and reliable, because there is no need to use batteries, which may degrade and/or may require replacements. This is particularly useful for important but seldom used objects, e.g. a passport.

[0031] In one example, the emitting of the signal for energizing the at least one RFID tag comprises emitting at least one signal burst, in particular a predetermined number of signal bursts. In another example, after having been activated, the passive RFID tag sends back an RFID signal, a so-called backscattered signal, which is modulated by the RFID tag for transmitting digital information such as an ID.

[0032] In a further embodiment of the method according to the invention, the step of operating the object detection device comprises receiving the wireless signal transmitted from an autonomously wirelessly transmitting device, in particular from a mobile telephone and/or a mobile computer. Thus, the emitted signal of these devices is used to detect the presence of these devices within the detection range of the wireless detection unit.

[0033] In an example, the autonomously wirelessly transmitting device also comprises an autonomously electrical powder supply, for example an active RFID tag that comprises a battery as power supply. In this case, the active RFID tag may be attached to the portable object and its energy supply regularly checked.

[0034] In one example, the portable object regularly emits keep-alive or heartbeat signals according to the commonly used wireless protocols. According to this embodiment, these signals are used for detecting the presence of these wireless transmitting devices.

[0035] In a further embodiment of the method according to the invention, the portable object is a personal object, in particular an item of daily use and/or an item for travelling. Further, in particular the portable object is at least one of:

- a mobile telephone,
- a portable computer,
- a key or a bunch of keys,
- an umbrella,
- sun glasses,
- a medical box,
- a suitcase,
- a handbag,
- a travel bag,
- a defined number of luggage pieces,
- sports equipment, and
- photo/film equipment.

[0036] An item of daily used is typically carried around during the day for a substantial amount of time.

[0037] For example the portable object is a wallet, a key such as a car key, an office key or an apartment key, but also a passport or a personal card such as an identification card, a driving license, a health card or a credit card, also items for travelling such as a map, a PDA, a personal computer, a memory stick, a briefcase, a document, further a piece of luggage or a personal article such as a medical box, a hygienic bag, a case for glasses (e.g. reading glasses or sunglasses) or a pocket knife.

[0038] In a further embodiment of the method according to the invention, the step of evaluating the received wireless signal comprises determining location information of the portable object, in particular determining at least one of:

- a presence or an absence of the portable object in a detection range of the object detection device,
- a proximity of the portable object to the object detection device,
- a distance between the portable object and the object detection device,
- a movement of the portable object relative to the object detection device,
- a position of the portable object relative to the object detection device, and
- an absolute position of the portable object.

[0039] In this way, particularly informative object identification and/or object localization is achieved.

[0040] The proximity, i.e. a rough distance estimation, or the distance, i.e. a measurement, may be determined from the signal intensity of the received RFID signal and/or its go-and-return time, i.e. the round-trip-time or the propagation time of the RFID signal, and may be presented by displaying a bar diagram. The movement may be determined from the variation of the phase relation of the received wireless signal and may be presented by displaying a symbol with increasing or decreasing size. The relative position may be determined using the principle of beamforming, for example by phase-controlling multiple antennas, and may be presented by displaying an arrow or a pointer. The absolute location may be determined from the relative position and by using a GPS module and may be presented by displaying a pin on a map.

[0041] In a further embodiment of the method according to the invention, the step of evaluating the received wireless signal comprises identifying the portable object, in particular by at least one of:

- a serial number,
- a telephone number,
- an ID,

- a tag description,
- a specific code,
- a frequency, and
- a phase relation.

[0042] The ID may be a unique identification number, possibly worldwide. This way, a reliable detection and efficient management of a large number of portable objects is achieved.

[0043] In one example, the data for identification of the portable object are defined by the manufacturer or by the user and these identification data are accessible by a corresponding reading device. The user may transfer the identification data into the object detection device or into the remote control device via manual input or via data transfer. In another example the identification data can be transferred directly via the internet.

[0044] In one example, the operation of the wireless detection unit comprises emitting a wireless object-specific call signal, i.e. enquiry signal and the step of receiving the wireless signal comprises receiving a corresponding response from the portable object. This avoids interference between multiple portable objects. The object-specific call signal may be generated according to at least one of: a code sequence, a modulation, a frequency and a polarization.

[0045] In a further embodiment of the method according to the invention, the object information is presented via a user output interface of a remote control device that is wirelessly connected to the object detection device and/or via a user output interface of the motor vehicle, in particular via a display unit located at or built into a dashboard of the motor vehicle.

[0046] In an example, the display unit is a multi-purpose display unit which is also used for other displaying tasks such as GPS navigation, maintenance information or parking assistance.

[0047] In a further example, the presenting of the object-related information comprises displaying a visual information, in particular a symbol or an icon, and/or emitting an acoustic signal, in particular a tune. An acoustic signal is particularly convenient for motor vehicles, because there is no need to observe a display. The user output interface may also be used as user input interface, for example in case of a touch screen device.

[0048] In a further example, the user output interface presents information of the detection quality. In a further example the object detection device and/or the remote control device emits an alarm, if a portable object selected for detection is not present, in particular if the object information substantially deviates from previously determined object information, further in particular if the intensity of the received wireless signal drops below a predetermined level such as below 50% of a previously determined level. This way the user's attention is instantly drawn to a portable object that has been left in the interior of the vehicle.

[0049] Further, the invention concerns an object detection device for a motor vehicle, which is configured to perform the method according to any one of the preceding method embodiments.

[0050] Further, the invention concerns an object detection device for a motor vehicle to indicate information of at least one wirelessly connectable portable object. The object detection device comprises a wireless detection unit for receiving a wireless signal transmitted from the at least one portable object and an evaluation unit for evaluating the received wireless signal to determine object information that is indicative of the presence or absence of the at least one portable object in the interior of the motor vehicle. The object detection device is connectable to a user output interface for transmitting the object information to the user output interface to present the object information to the user of the object detection device. In this way, the user conveniently obtains a quick overview and confirmation that everything needed is "on board" before he drives away with the motor vehicle for a journey.

[0051] In an example, the object detection device is connectable to a user input interface such as a button or a touch screen for receiving a control command, which activates the wireless detection unit, directly or via a remote control device. In another example, the user output interface is a display unit such as a screen, a monitor or a touch screen. In a further example, the wireless detection unit comprises one or more antennas, in particular a MIMO (Multiple Input Multiple Output) configuration for providing a multipath wireless connection to the portable object.

[0052] In a further embodiment of the object detection device according to the invention, the wireless detection unit is configured to provide a wireless detection range between 0.3 m and 5 m, in particular between 1 m and 3 m, and/or a maximum transmission power of 1 Watt ERP, in particular 0.5 Watt ERP. This avoids receiving a wireless signal from distances, which are not of concern. The above specified configuration achieves an improved reliability combined with energy savings.

[0053] In a further example, the wireless detection unit is configured for UHF operation (Ultra-high frequency, i.e. 0.3 to 3 GHz), in particular to operate at a frequency between 0.8 and 1 GHz. In another example, the wireless detection unit is configured to operate according to the ISO18000-6B or the EPC Global Gen2 standard (860-960 MHz or 902-928 MHz). In another example, the wireless detection unit is configured to operate at frequencies used for wireless WAN telecommunication (GSM, UMTS, LTE).

[0054] Further, the invention concerns a motor vehicle, in particular a passenger car or a travel bus, comprising the object detection device according to any of the preceding object detection device embodiments, wherein the object detection device is electrically connected to the power supply system of the motor vehicle and/or operationally connected to the operating system of the motor vehicle. In another example, the object detection de-

vice comprises an electrical terminal for connecting the object detection device to the power supply of the motor vehicle and/or a data interface for connecting the object detection device to the operating system of the motor vehicle. The electric connection to the power supply system of the motor vehicle allows for a powerful operation of the object detection device and in particular of the wireless detection unit and the connection to the operating system of the motor vehicle allows for coordination with other operations such as the locking of the doors or starting the engine.

[0055] The invention further concerns an application program product being executable on an object detection device and/or a remote control device for performing the method according to any one of the preceding method embodiments, wherein the presentation of the object information and/or an identification of the at least one portable object is user selectable and/or user configurable. This way an informative design and/or efficient selection of the tag information are achieved. In one example, the application program product is a so called "App", which is conveniently downloadable and easy to install.

[0056] In a further embodiment of the invention, the application program product comprises a set of multiple user selectable scenarios, in particular scenarios comprising a user definable visualization, further in particular a configurable and/or designable visualization. This way an optimized presentation of the actual and/or relevant tag information is achieved, with a presentation that is adapted to the individual needs and preferences of the user.

[0057] In another example, the application program product, the scenarios or the components can be downloaded from an internet server and installed by the user and/or may be designed by the user himself, for example by using a organizer and/or graphical program.

[0058] In a further example, data concerning the configuration of the application program product, in particular the user defined scenarios and/or the graphical representations of the portable objects to be detected, are determined on the remote control device and then transferred as configuration data to the object detection device or to its evaluation unit. This way an independent operation of the object detection device is achieved.

[0059] The method according to the invention may also be useful to determine portable objects, which should not be carried away, for example an archive key from an office or a room key from a hotel. Of course, this only works if the object in question has previously been equipped with an RFID tag.

[0060] The effects and advantages of the above mentioned method also apply to the object detection device, the remote control device and the application program product and vice versa. Further, it is expressly pointed out that any combination of the above-mentioned embodiments, or combinations of combinations, is subject to a further combination. Only those combinations are excluded that would result in a contradiction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0061] Below, the present invention is described in more detail by means of exemplary embodiments and the attached drawings, wherein:

Fig. 1 shows a simplified illustration of a car 1 with an object detection device 10 according to the invention, a touch screen device 30 and a briefcase 20;

Fig. 2 a simplified illustration of a dashboard 3 of car 1 according to Fig. 1 and the touch screen device 30;

Fig. 3 a simplified block diagram illustrating the object detection device 10 according to Fig. 1;

Fig. 4 a illustration according to Fig. 3 with a remote control device 40;

Fig. 5 a simplified flow diagram illustrating the method according to the invention for operating the object detection device 10 of Fig. 3; and

Fig. 6 a simplified illustration showing a user definable scenario on a touch screen 42 of a mobile telephone 40 according to Fig. 4.

BRIEF DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0062] The embodiments described herein are meant as illustrative examples and shall not limit the invention. The same features are denoted by the same reference sign in all the figures. Fig. 1 shows a simplified illustration of a car 1 with an object detection device 10 according to the invention, a touch screen device 30 and a briefcase 20, with an attached RFID tag 22. The car is an example of a motor vehicle, the touch screen 30 is a user input device combined with a display device and the briefcase 20 is a portable object in the sense of the invention. Attached to the briefcase 20 is a passive RFID tag 22.

[0063] In operation, the object detection device 10 determines the presence of the briefcase 20 in the trunk of the car 1 by detecting the presence of the RFID tag 22 in its wireless detection range (indicated by the double-sided arrow). The object detection device 10 transmits the corresponding information to the touch screen device 30, where the information is presented to the driver of the car, i.e. informing the driver about the presence or absence of the briefcase 20 in the trunk of the car 1. Further details of the operation are explained in the description of Fig. 3.

[0064] In this example the wireless detection range is approximately 3 meter (drawing is not to scale), such that all portable objects of interest or RFID tags in the interior of the car are reliably detected.

[0065] Fig. 2 shows a simplified illustration of a dashboard 3 of the car and the touch screen device 30 according to Fig. 1. The touch-screen device 30 comprises a touch screen 32 as user output interface and a touch sensitive area 34 as a user input interface. The touch sensitive area 34 is located on the touch screen 32 and corresponds to the function of an electrical push-button.

[0066] In this example, the user (schematically depicted as a hand) touches the touch-sensitive area 34 of the touch screen device 30 to activate a wireless detection of the briefcase (not shown) and receives an optical indication, in this case a symbol representing the briefcase and an associated indicator symbol, which confirms that the briefcase has been detected in the interior of the car (depicted as checked sign).

[0067] Fig. 3 shows a simplified block diagram illustrating the object detection device 10 according to Fig. 1. The car 1 (schematically indicated by the dot-dashed line) comprises the RFID-tagged briefcase 20 and a mobile telephone 24 as portable objects, the object detection device 10 and the touch screen device 30.

[0068] The object detection device 10 comprises an RFID transponder 12 as wireless detection unit, which comprises a sender, a receiver and an RFID antenna 13. The RFID antenna 13 may be implemented by a dipole or a spiral antenna. The RFID transponder 12 is capable of detecting the presence of the RFID-tagged briefcase 20 as well as the presence of the mobile telephone 24.

[0069] Further, the object detection device 10 comprises an evaluation unit 14, which is connected to the RFID transponder 12. The evaluation unit 14 may be implemented by a microprocessor, in particular a digital and/or programmable processor. The object detection device 10, in particular the RFID transponder 12 and/or the evaluation unit 14, is connected to the energy supply system and to the operating system of the car 1 (not shown).

[0070] The RFID tag 22 comprises a processing unit, i.e. an RFID chip such as an NXP-Chip and an RFID tag antenna (not shown). In this example, the RFID tag 22 is a passive UHF tag, which is operated according to the ISO/IEC 18000-6C standard at a frequency of 868 MHz. The wireless detection unit 12 of the object detection device 10 is configured to match the RFID tag 22, i.e. it uses corresponding protocols, modulation and frequencies.

[0071] Further, the evaluation unit 14 is operationally connected to the touch screen device 30, in this case via an electrical connection, in particular via a bus system of the car, for transmitting object information OI from the evaluation unit 14 to the touch screen device 30 and for transmitting a user control command CC from the touch screen device 30 to the evaluation unit 14.

[0072] In operation, if the user wishes to confirm that his briefcase is in the interior of the car 1, he may initiate a search for this brief case 20 by touching the touch-sensitive area 34. Accordingly, the touch screen device 30 sends a user control command CC to the evaluation unit 14, which - upon receiving the user control command CC - activates the RFID transponder 12. The RFID transponder 12 emits an RFID energizing signal ST via the RFID-antenna 13 for energizing the RFID tag 22 of the brief case 20 (indicated by arrow). Having been energized, the RFID tag 22 returns an RFID signal SR (indicated by arrow) to the RFID transponder 12 in response to the RFID energizing signal ST.

[0073] In addition and without need for energizing, the mobile telephone 24 sends a wireless signal SR to the RFID transponder 12. The RFID transponder 12 is capable to detect the wireless signal SR emitted by the mobile telephone 24 by adapting to the corresponding frequencies, modulation and protocols. In a further example, the RFID transponder 12 sends a call signal to the mobile telephone 24, which then answers this call by returning a corresponding wireless signal SR.

[0074] After having received the RFID signals SR from the RFID tag 22 and from the mobile telephone 24 the RFID transponder 12 transfers the corresponding intermediate signals to the evaluation unit 14. The evaluation unit 14 evaluates the intermediate signals and determines object information OI and sends this information to the touch screen device 30. The touch screen device 30 displays the object information OI on its display 32 as two check signs, which according to the present example confirm that the briefcase 20 and the mobile phone 24 are on board of the car 1.

[0075] In a further example, at least part of the object detection device 10, in particular the RFID transponder 12 and/or the evaluation unit 14, is integrated into the touch screen device 30.

[0076] Fig. 4 shows an illustration according to Fig. 1 with a mobile telephone 40 that is wirelessly connected to the object detection device 10 as a remote control device, in this example via a Bluetooth connection.

[0077] The mobile telephone 40 comprises a touch screen 42 and a push-button 44 adjacent to the touch screen 42. The mobile telephone 40 as a similar function as the touch screen device 30 of Fig. 3, i.e. the push-button 44 is used to provide the user control command CC to the evaluation unit 14 and the touch screen 42 displays the object information OI received from the evaluation unit 14.

[0078] In addition configuration data CD, as described below with reference to Fig. 6, are transmitted from the mobile telephone 40 to the evaluation unit 14. The object detection device 10 can also be operated with the built-in touch screen device 30 with or without a connection to the mobile telephone 40.

[0079] Fig. 5 shows a simplified flow diagram illustrating the method according to the invention for operating the object detection device of Fig. 3.

[0080] In this example, the method performs a number of steps, depicted as blocks 100, 110, 120, 130 and 140. The steps are explained by the following instructions, wherein the reference signs refer to Fig. 3:

Block 100: Keep the wireless detection unit 10 in a substantially deactivated state.

Block 110: Query, whether a user control command SU has been received from the touch screen device 30; if yes (Y) initiate a transmission timer according to a predetermined value, activate the wireless detection unit 12 and go to block 120, if not (N) return to block 120.

Block 120: Emit an energizing signal ST for energizing the RFID tag 22.

Block 130: Query, whether the transmission timer has expired or the user control command SU is present; if yes (Y) go to block 140, if not (N) return to block 120.

Block 140: Receive an RFID signal SR from the RFID tag 22, deactivate the wireless detection unit 12 and evaluate the received RFID signal SR for determining object information OI by deciding, whether the RFID tag 22 is within the RFID detection range or not and display this object information OI on the touch screen device 30.

[0081] Thus, according to the above method, the user receives up-to-date object information OI shortly after he has touched the touch-sensitive area 34 of the touch screen device 30, for example, at the moment before the user drives away from home, his office, a sports hall or a hotel. In addition, the user can control the duration of the energizing of the RFID tag 22 and hence the range of the RFID detection range.

[0082] Typically, the user requests an update of the object information OI several times per day, for example between 1 and 10 times per day.

[0083] Fig. 6 shows a simplified illustration of a mobile telephone 40 according to Fig. 4 with the touch screen 42. Instead of a push-button, a touch-sensitive area 46 of the touch screen 42 is used as user input interface.

[0084] The touch screen 42 depicts at its header a series of different scenarios with user definable visualization, which can be configured and/or arranged by the user of the mobile telephone 40. Also the visualization of these scenarios, i.e. the graphical representations can be configured and/or designed by the user. In this example, the scenarios "family", "business" and "sports" are shown and others are available. The user can scroll trough the scenarios and select a specific one of them by touching the touch-sensitive area 46. In this example, the user has selected the scenario "business" (indicated by the bold frame). The "business" scenario comprises a list of 5 pictograms representing 5 portable objects, which the user has configured in advance according to his personal preferences and needs, in this example: a briefcase, a mobile phone, a bunch of keys, a street map and sunglasses. Further items can be configured.

[0085] After the user has touched the touch-sensitive area 46, the application program performs the method according to the invention and presents the object information OC (see Fig. 4) on the display 42. The object information OC shows for each of the portable objects of the selected scenario, whether the respective portable object is considered present in the RFID detection range of the object detection device (indicated by checked signs). In this case the briefcase, the mobile phone, the bunch of keys and the sunglasses are considered present; the street map appears to be missing.

[0086] In this example, the application program product according to the invention is loaded onto the mobile telephone 40 and executed there as an application program, as a so-called "app". This application program product enables the user to configure and/or arranged the scenarios and/or their components, i.e. the portable objects to be detected.

[0087] The data concerning the user configuration of the application program product, i.e. data corresponding to the scenarios and their associated portable products, are transferred as configuration data CD (see Fig. 4) to the object detection device the evaluation unit. This way the object detection device can operate independently from the mobile telephone.

Claims

1. A method of operating an object detection device (10) of a motor vehicle (1) for indicating information of at least one wirelessly connectable portable object (20, 24), the method comprising the steps of:

   - operating the object detection device (10) to receive a wireless signal (SR) from the at least one portable object (20, 24);
   - evaluating the received wireless signal (SR) for determining object information (OI) that is indicative of the presence or absence of the at least one portable object (20, 24) in the interior of the motor vehicle (1); and
   - presenting the object information (OI) via a user output interface (32; 42) to the user of the object detection device (10).

2. The method according to claim 1, wherein the object detection device (10) or a wireless detection unit (12) thereof is operated during a user controlled period of time or a predetermined period of time, in particular during a specified object detection time, further in particular during less than 1 minute or less than 5 seconds.

3. The method according to claim 1 or 2, wherein the method comprises the step of receiving a user control command (CC) and thereupon performing the step of operating the object detection device (10), in particular receiving the user control command (CC)

from a user input interface (34) of the motor vehicle (1) and/or from a user input interface (44; 46) of a remote control device (40), further in particular from a touch-screen device (30; 40) used for presenting the object information (OI).

4. The method according to the preceding claim, wherein the receiving of the user control command (CC) comprises detecting a user initiated event, in particular an occurrence of at least one of:

- a manipulation, in particular an actuation of a button (44) or a touching action on a touch-sensitive area (34; 46) of a touch screen device (30; 40),
- an acoustic signal, in particular a spoken command, and
- a movement of the user, in particular a gesture.

5. The method according to any one of the preceding claims, wherein the step of operating the object detection device (10) comprises receiving an RFID signal (SR) from an RFID tag (22) that is attached to the at least one portable object (20), wherein in particular the RFID tag (22) is a passive RFID tag and the step of operating the object detection device (10) comprises sending an RFID energizing signal (ST) to the RFID tag (22) for energizing the RFID tag (22).

6. The method according to any one of the preceding claims, wherein the step of operating the object detection device (10) comprises receiving the wireless signal (SR) transmitted from an autonomously wirelessly transmitting device (24), in particular from a mobile telephone and/or a mobile computer.

7. The method according to any one of the preceding claims, wherein the portable object (20, 24) is a personally used object, in particular an item of daily use such as a mobile phone (24) and/or an item used for travelling such as a piece of luggage (20).

8. The method according to any one of the preceding claims, wherein the step of evaluating the received wireless signal (SR) comprises determining location information of the portable object (20, 24), in particular determining at least one of:

- a presence or an absence of the portable object (20, 24) in a detection range of the object detection device (10),
- a proximity of the portable object (20, 24) to the object detection device (10),
- a distance between the portable object (20, 24) and the object detection device (10),
- a movement of the portable object (20, 24) relative to the object detection device (10),
- a position of the portable object (20, 24) relative to the object detection device (10), and
- an absolute position of the portable object (20, 24).

9. The method according to any one of the preceding claims, wherein the step of evaluating the received wireless signal (SR) comprises identifying the portable object (20, 24), in particular by at least one of:

- a serial number,
- a telephone number,
- an ID,
- a tag description- a tag description,
- a specific code,
- a frequency, and
- a phase relation.

10. The method according to any one of the preceding claims, wherein the object information (OI) is presented via a user output interface (42) of a remote control device (40) that is wirelessly connected to the object detection device (10) and/or via a user output interface (32) of the motor vehicle (1), in particular via a display unit (30) located at or built into a dashboard (3) of the motor vehicle (1).

11. An object detection device (10) for a motor vehicle (1), which is configured to perform the method according to any one of the preceding claims.

12. An object detection device (10) for a motor vehicle (1) to indicate information of at least one wirelessly connectable portable object (20, 24), the object detection device (10) comprising a wireless detection unit (12) for receiving a wireless signal (SR) transmitted from the at least one portable object (20, 24) and an evaluation unit (14) for evaluating the received wireless signal (SR) to determine object information (OI) that is indicative of the presence or absence of the at least one portable object (20, 24) in the interior of the motor vehicle (1), wherein the object detection device (10) is connectable to a user output interface (32; 42) for transmitting the object information (OI) to the user output interface (32; 42) to present the object information (OI) to the user of the object detection device (10).

13. A motor vehicle (1), in particular a passenger car or a travel bus, comprising the object detection device (10) according to claim 11 or 12, wherein the object detection device (10) is electrically connected to the power supply system of the motor vehicle (1) and/or operationally connected to the operating system of the motor vehicle (1).

14. An application program product being executable on an object detection device (10) and/or a remote control device (40) for performing the method according

to any one of the claims 1 to 10, wherein the presentation of the object information (OI) and/or an identification of the at least one portable object (20, 24) is user selectable and/or user configurable.

15. The application program product according to claim 14, comprising a set of multiple user selectable scenarios, in particular scenarios comprising a user definable visualization, further in particular a configurable and/or designable visualization.

Fig. 1

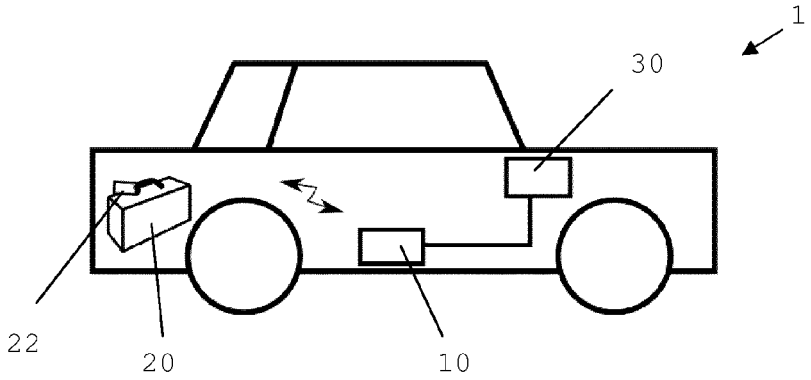


Fig. 2

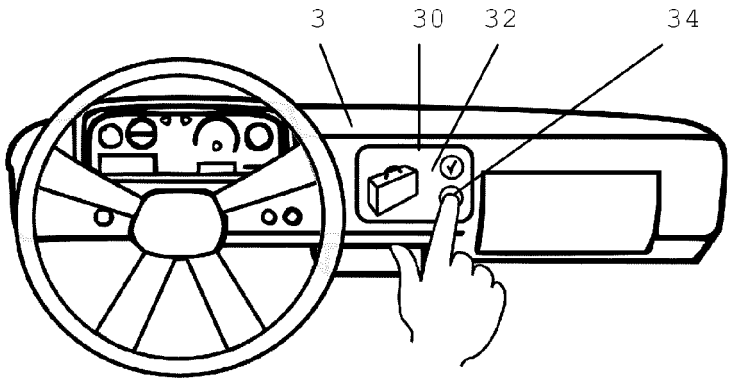


Fig. 3

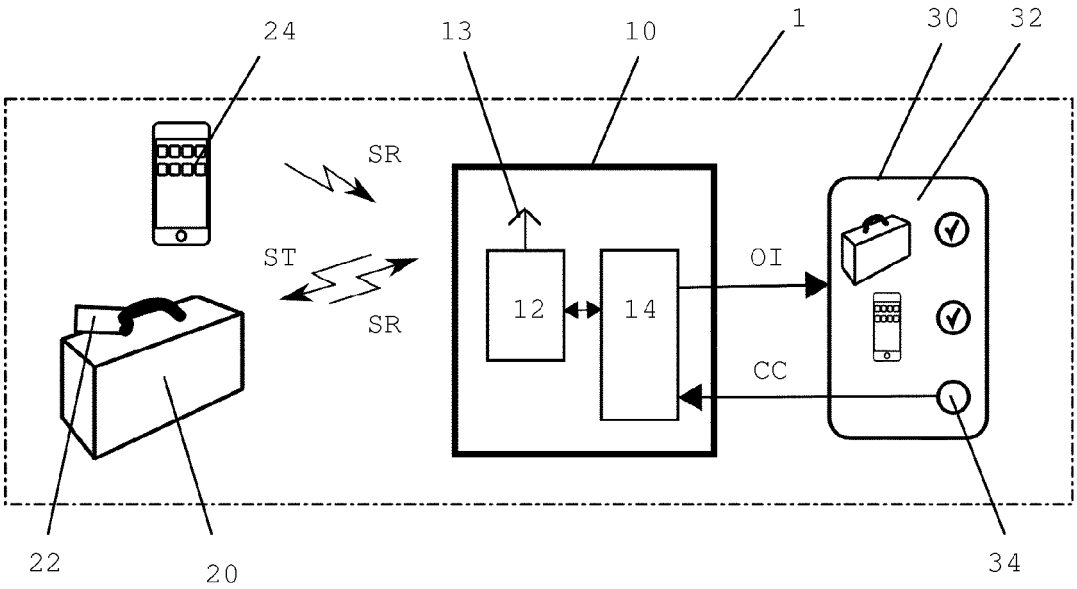


Fig. 4

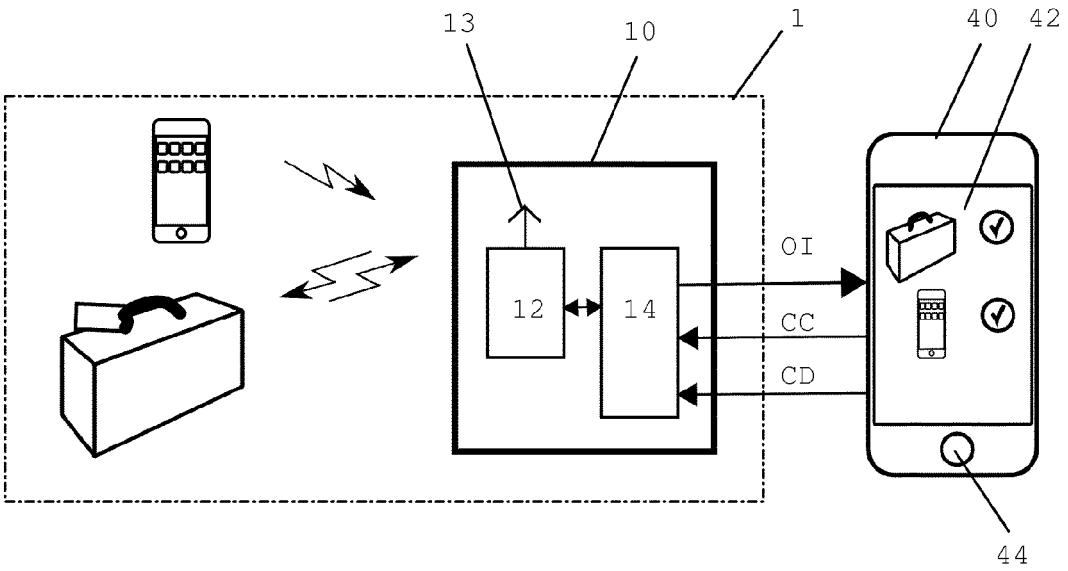


Fig. 5

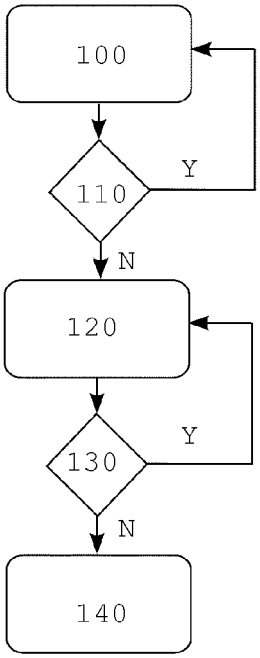
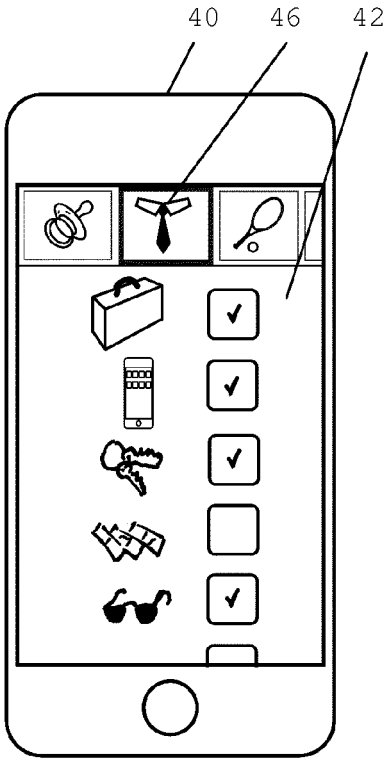


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 14 16 6124

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2010/253473 A1 (RORK JOSEPH PAUL [US] ET AL) 7 October 2010 (2010-10-07) * paragraphs [0001], [0004], [0005], [0019] - [0022], [0024], [0027], [0030]; figure 2 * * paragraphs [0031], [0036], [0040], [0041]; figure 9 * -----	1-15	INV. G08B21/24 G06Q10/08
X	US 2007/035397 A1 (PATENAUDE RUSSELL A [US] ET AL) 15 February 2007 (2007-02-15) * paragraphs [0001], [0004] - [0006], [0014], [0016], [0018] - [0020], [0039] - [0045], [0051], [0052], [0055] * -----	1-5,7-15	

TECHNICAL FIELDS SEARCHED (IPC)

G08B
G06Q
B60R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	15 October 2014	Fagundes-Peters, D

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15-10-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010253473 A1	07-10-2010	US 2010253473 A1	07-10-2010
		US 2012212333 A1	23-08-2012
US 2007035397 A1	15-02-2007	CN 1912906 A	14-02-2007
		DE 102006037033 A1	22-02-2007
		US 2007035397 A1	15-02-2007

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Patent documents cited in the description

- US 20120050021 A1 **[0002]**