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(54) **METHOD FOR CONTROLLING THE AUTOMATIC DISPLAY OF A PICTOGRAM REPRESENTATIVE OF THE IMMINENT OPENING OF A DOOR**

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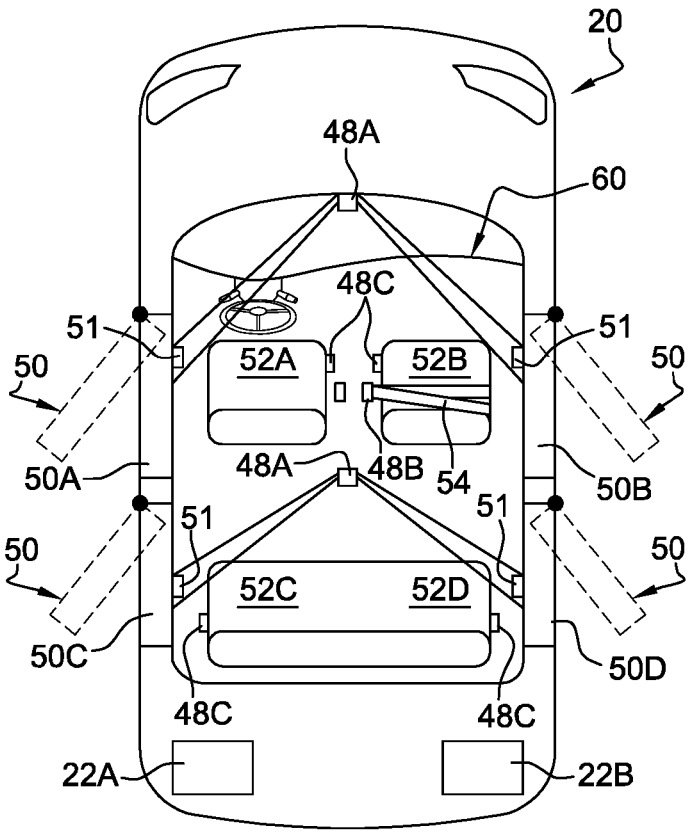
(57) **ABSTRACT**

A method for controlling a display means on board a motor vehicle, characterized in that it includes: a first step of determining the imminent opening of a door, during which it is checked that at least one parameter representative of the imminent opening of a door of the motor vehicle fulfils at least one predetermined condition, a second step of developing a display order that is triggered when the predetermined conditions are fulfilled, and during which an order to display a pictogram representative of the imminent opening of a door on the display means is emitted by an electronic control unit.



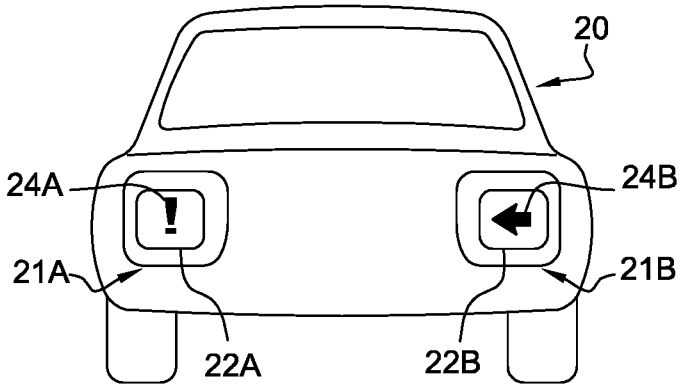


Fig. 1

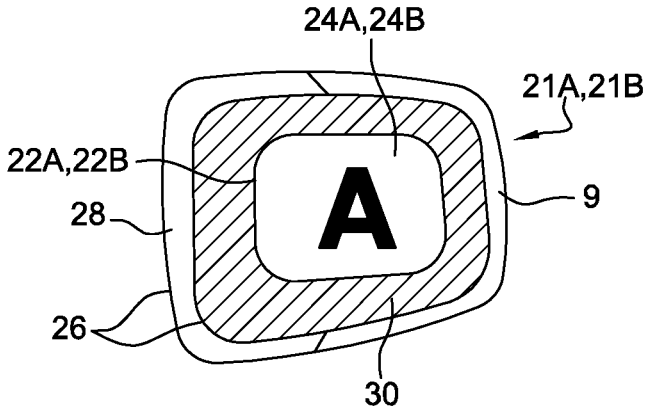


Fig. 2

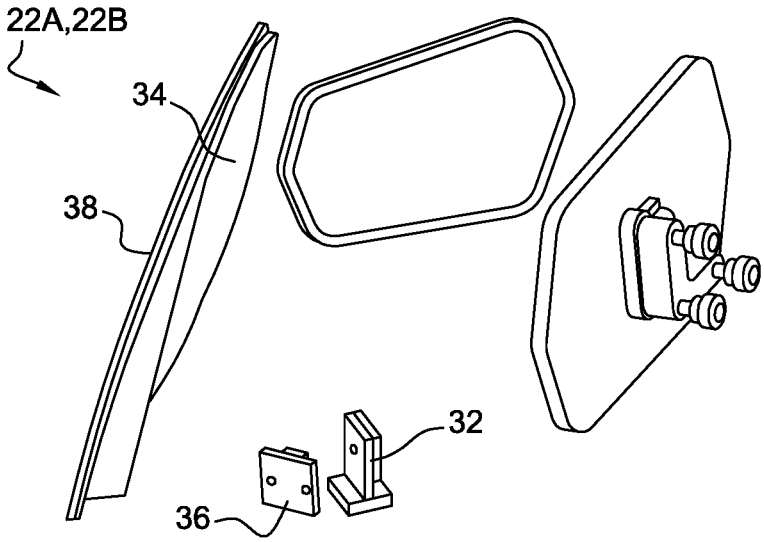


Fig. 3

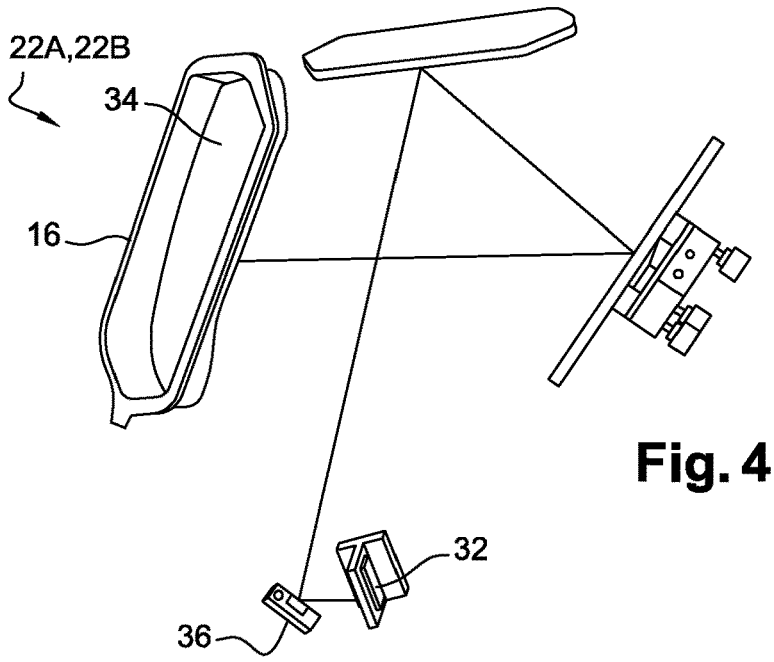


Fig. 4

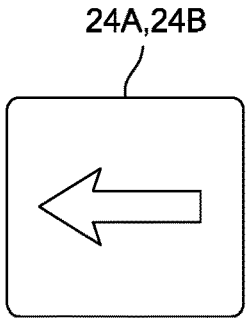


Fig. 5A

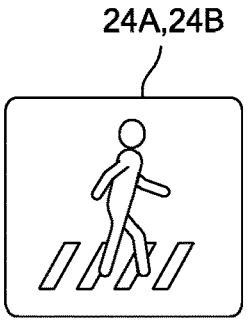


Fig. 5B

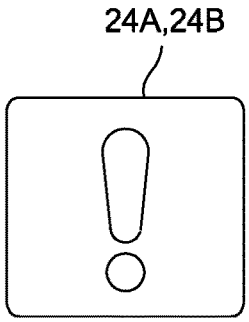


Fig. 5C

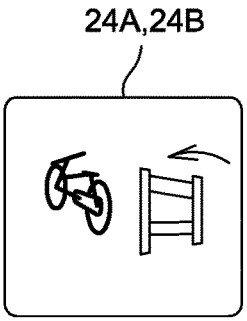


Fig. 5D

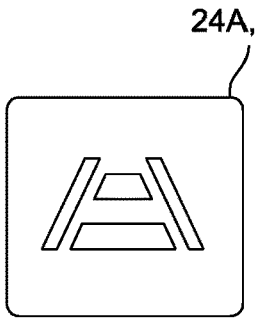


Fig. 5E

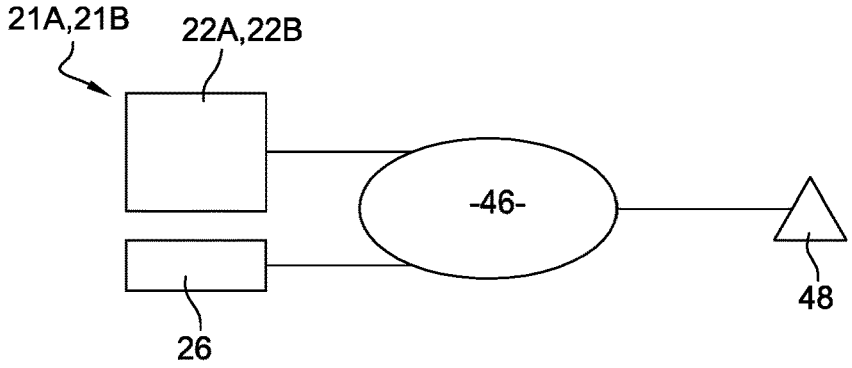


Fig. 6

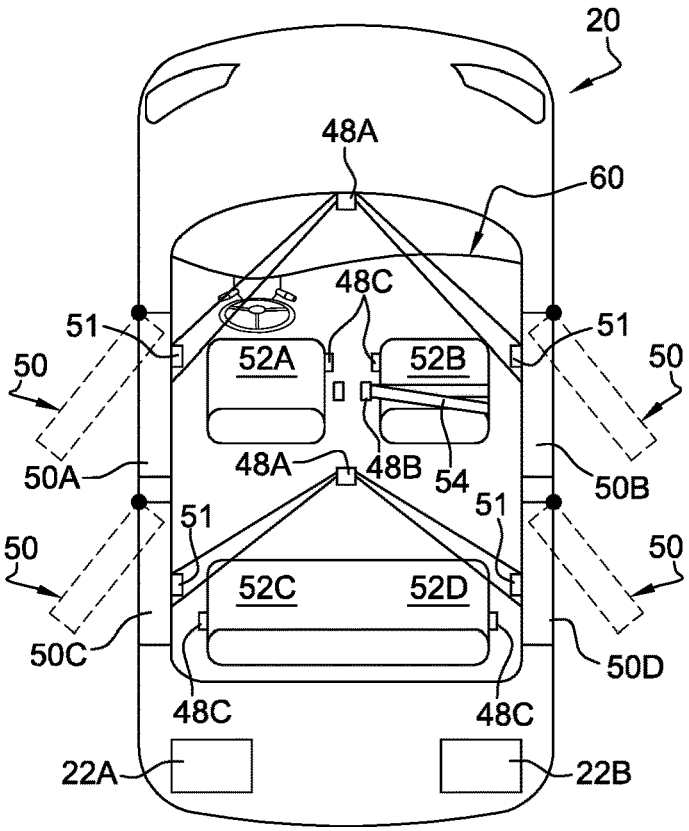


Fig. 7

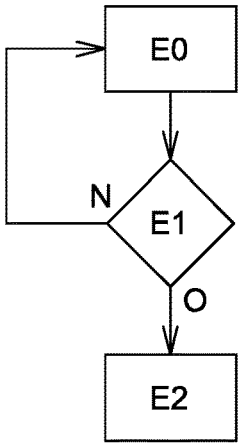


Fig. 8

METHOD FOR CONTROLLING THE AUTOMATIC DISPLAY OF A PICTOGRAM REPRESENTATIVE OF THE IMMINENT OPENING OF A DOOR

TECHNICAL FIELD OF THE INVENTION

[0001] The invention relates to a method for controlling a display means on board a motor vehicle, the display means including a display area visible from outside the vehicle, the display means being configured to selectively display each of the pictograms from a list of a plurality of predetermined to pictograms, each predetermined pictogram being representative of a determined situation.

TECHNICAL BACKGROUND OF THE INVENTION

[0002] When an occupant of a motor vehicle wishes to get out of the vehicle, he has to pay attention so that no other road users, for example a bicycle, a pedestrian or a vehicle, are liable to be inconvenienced or struck when his door is opened. This attention is particularly necessary when the door to be opened is situated on the side of the road, but it is also preferable to pay attention so as not to collide with a pedestrian when the door is situated on the side of a pavement.

[0003] Some motor vehicles include doors that are equipped, on the inside wall thereof, with visual means, for example reflective strips or lights, so as to allow a road user to see an open door from afar, in particular in poor ambient lighting conditions, for example at night.

[0004] However, these visual means allow the door to be seen once it is open, but they do not allow a road user to anticipate the opening of a closed door.

[0005] Vehicles do not have any signalling means that make it possible to warn of the imminent opening of a door. Vigilance when opening the door is thus entirely down to the occupants of the vehicle. Now, in some situations, it may be the case that the occupant of the vehicle does not employ the vigilance necessary to avoid accidents. This is the case in particular when a child actuates the door in order to get out without paying attention.

BRIEF SUMMARY OF THE INVENTION

[0006] In order in particular to solve the abovementioned problems, the invention proposes a control method of the type described above, characterized in that the method includes:

[0007] a first step of determining the imminent opening of a door of the vehicle, during which it is checked that at least one parameter representative of the imminent opening of a door of the motor vehicle fulfils at least one predetermined condition;

[0008] a second step of developing a display order that is triggered when the predetermined conditions are fulfilled, and during which an order to display a pictogram representative of the imminent opening of a door of the vehicle on the display means is emitted by an electronic control unit.

[0009] According to other features of the invention:

[0010] a parameter representative of the imminent opening of a door of the vehicle is formed by the speed of the vehicle, an associated condition to be fulfilled in the first step being that the speed of the vehicle is zero;

[0011] a parameter representative of the imminent opening of a door of the vehicle is formed by the operating state of the engine of the vehicle, an associated condition to be fulfilled in the first step being that the engine changes from the turned-on state to the turned-off state;

[0012] a parameter representative of the imminent opening of a door of the vehicle is formed by the time that has elapsed since an engine of the vehicle was turned off, an associated condition to be fulfilled in the first step being that a time delay has been exceeded, starting from the turning off of the engine of the vehicle;

[0013] the motor vehicle includes a sensor for sensing the presence of a hand of an occupant of the vehicle close to or in contact with an interior control element for opening the door, a fourth parameter representative of the imminent opening of a door of the vehicle being formed by the presence of a hand close to or in contact with the interior opening control element, an associated condition to be fulfilled in the first step being the presence of a hand close to the interior opening control element being detected;

[0014] the presence sensor is formed by at least one camera;

[0015] the presence sensor is formed by at least one infrared sensor arranged close to the interior opening control element;

[0016] the presence sensor is formed by at least one capacitive sensor arranged close to the interior opening control element;

[0017] a parameter representative of the imminent opening of a door of the vehicle is formed by the buckle state of a safety belt fitted in the vehicle, an associated condition to be fulfilled in the first step being that the safety belt changes from a buckled state to an unbuckled state;

[0018] a parameter representative of the imminent opening of a door of the vehicle is formed by the detection of an occupant on his seat, an associated condition to be fulfilled in the first step being that a weight greater than a determined threshold is detected on said seat;

[0019] a parameter representative of the imminent opening of a door of the vehicle is formed by the locking state of a lock of at least one door, an associated condition to be fulfilled in the first step being that the lock of at least one door changes from a locked state to an unlocked state;

[0020] the vehicle is equipped with a geolocation device into which the driver is able to enter at least one destination determined by the driver, a parameter representative of the imminent opening of a door of the vehicle being formed by the geographical location, detected by the geolocation device, of the vehicle, an associated condition to be fulfilled in the first step being that the vehicle has reached the determined destination;

[0021] the vehicle is equipped with an automatic parking assistance device, a parameter representative of the imminent opening of a door of the vehicle being formed by the actuation of the parking assistance device, an associated condition to be fulfilled in the first step being that the parking assistance device has been actuated;

[0022] the motor vehicle includes two display means that are each arranged on a side of the vehicle, at least one of the parameters representative of the imminent opening of a door of the vehicle being able to detect the side on which the door whose opening is imminent is situated, the display order developed in the second step being sent only to the display means arranged on the same side as said door whose imminent opening was detected in the first step.

[0023] the rear of the motor vehicle includes a single display means;

[0024] the motor vehicle includes at least one display means that is arranged on the side and/or at the front of the vehicle.

[0025] The invention also relates to a system for displaying at least one pictogram on a motor vehicle, comprising:

[0026] a display means comprising a display area intended to be arranged on the vehicle so as to be visible from outside the vehicle;

[0027] at least one device for detecting parameters representative of the imminent opening of a door of the vehicle;

[0028] an electronic control unit for controlling the display means and that is connected to the detection device and to the display means in order to be able to control the display of a pictogram representative of the imminent opening of a door of the vehicle on the basis of the detected parameters representative of the opening of a door of the vehicle.

[0029] According to another feature of the display system, each device for detecting parameters representative of the imminent opening of a door of the vehicle is chosen from the following list:

[0030] a speed sensor of the vehicle;

[0031] a manual control element for turning off an engine of the vehicle;

[0032] a timer measuring the time that has elapsed starting from the turning off of the engine of the vehicle;

[0033] a sensor for sensing the presence of a hand of an occupant of the vehicle close to or in contact with an interior control element for opening a door;

[0034] a device for detecting the buckle state of a safety belt fitted in the vehicle;

[0035] a sensor for sensing the presence of an occupant on a seat of the vehicle;

[0036] a geolocation device of the vehicle;

[0037] an automatic parking assistance device of the vehicle.

[0038] The invention also relates to a motor vehicle comprising a display system produced according to the teaching of the invention.

BRIEF DESCRIPTION OF THE FIGURES

[0039] Further features and advantages of the invention will become apparent from reading the following detailed description, for an understanding of which reference is made to the appended drawings, in which:

[0040] FIG. **1** is a rear view that schematically shows a vehicle equipped with two signalling devices for displaying pictograms and that are able to apply the method carried out according to the teaching of the invention,

[0041] FIG. **2** is a detailed view that schematically shows a signalling device for displaying pictograms,

[0042] FIG. **3** is a perspective view that schematically shows one embodiment of the display means according to the invention,

[0043] FIG. **4** is a plan view that schematically shows the display means of FIG. **3**,

[0044] FIGS. **5**A to **5**E show examples of pictograms able to be displayed by the display means of the vehicle, the pictogram of FIG. **5**D being particularly representative of a situation of the imminent opening of a door of the vehicle;

[0045] FIG. **6** is a diagram that shows one embodiment of the invention implementing an electronic control unit for controlling the display means on the basis of data supplied by sensors on board the vehicle;

[0046] FIG. **7** is a plan view that schematically shows a motor vehicle passenger compartment equipped with sensors that are intended to measure parameters representative of the imminent opening of a door;

[0047] FIG. **8** is a block diagram that illustrates the steps of the method carried out according to the teaching of the invention.

DETAILED DESCRIPTION OF THE FIGURES

[0048] In the rest of the description, elements having an identical structure or similar functions will be denoted by the same references.

[0049] FIG. **1** shows a vehicle with an on-board display means. This display means includes a display area visible to third parties from outside the vehicle.

[0050] In the example shown in FIG. **1**, the vehicle **20** is equipped with two signalling lighting devices **21**A, **21**B including pictogram display means **22**A, **22**B. Each display means **22**A, **22**B comprises a display area **24**A, **24**B arranged at the rear of the vehicle **20**, substantially at the location where a rear signalling light is normally positioned. Thus, a first display means **22**A is arranged on the left-hand side of the vehicle **20**, whereas a second display means **22**B is arranged on the right-hand side of the vehicle **20**.

[0051] In one variant, not shown, the motor vehicle includes a single display means that is arranged at the rear.

[0052] According to another variant, not shown, the motor vehicle includes at least one display means that is arranged on the side and/or at the front of the vehicle. This variant may be combined with the presence of at least one display means at the rear of the vehicle.

[0053] The role of the display means **22**A, **22**B is to display pictograms in luminous form on the display area **24**A, **24**B. The display area **24**A, **24**B thus has a surface illuminated in accordance with the form of the pictogram, said illuminated surface emitting a light beam called a "pictogram beam".

[0054] The pictograms may be used to contribute to a regulatory signalling function. They may also be used independently of the use of a regulatory signalling function.

[0055] The regulatory photometric characteristics of signalling lights, such as position lights, direction indicator lights, stop lights or fog lights, are well defined. They relate in particular to the minimum and maximum luminous intensity ranges to be complied with, the visibility angle of the beam, the colour of the beam, the surface area of the lighting surface of the function, or else the minimum distance between different functions.

[0056] When the display of the pictogram is used to perform a regulatory signalling function, the signalling device **21**A, **21**B may be produced in accordance with two embodiments.

[0057] In a first embodiment of the signalling device **21**A, **21**B, shown in FIG. **1**, the display means **22**A, **22**B are configured such that the pictogram beam is able on its own to fulfil the regulatory photometric characteristics of a defined signalling function. In this embodiment, the display means is thus designed to display pictograms that are parameterized so as to emit a pictogram light beam that complies with all of the regulatory requirements of a particular signalling function.

[0058] A single pictogram may in particular fulfil a plurality of functions at the same time or alternately, such as for example an indicator light and a position light. A plurality of pictograms may also be displayed at the same time or alternately, each pictogram fulfilling the photometric characteristics of a different function of the signalling light.

[0059] Preferably and advantageously, the signalling function achieved with certain pictograms is a position light function or a combined lamp and stop light function.

[0060] In a second embodiment of the signalling device **21**A, **21**B shown in FIG. **2**, the device **21**A, **21**B comprises additional signalling means **26**. These additional means **26** are intended to provide an additional beam that is added to the pictogram beam produced by the display means. The combination of the additional beam and the beam of the pictogram makes it possible to produce an overall light beam that achieves the regulatory photometric characteristics that are not fulfilled entirely by the pictogram beam on its own. The additional means **26** are equipped with at least one additional area **28**, **30**, in this case two of them, which are each able to transmit an additional light beam. Thus, by virtue of the additional means **26**, the signalling device **21**A, **21**B provides an overall light beam that fulfils the regulatory photometric characteristics.

[0061] The additional means **26** are for example lighting devices used for normal signalling light functions and that are independent of the display means **22**A, **22**B. They comprise a light source able to emit light rays, for example one or more light-emitting diodes, and means for distributing the light rays onto the additional area **28**, **30**, the additional area **28**, **30** transmitting the light rays by forming the additional beam. The distribution means may be a light guide or a reflector.

[0062] When a pictogram appears or it changes shape, the additional means **26** provide the appropriate additional beam substantially simultaneously, for example so as to increase the visibility angle and/or the luminous surface area of the overall beam.

[0063] As illustrated in the embodiment of FIG. **2**, the signalling device **21**A, **21**B may comprise a plurality of additional means **26**, in this case two of them, one per function. The two additional areas **28**, **30** are arranged at least partly around the display area **24**A, **24**B of the pictogram. An adjacent additional first area **30** surrounds the display area **24**A, **24**B and serves to complement the position light function—possibly in combination with a stop function. A second additional area **28** partly surrounds the first additional area **30** and serves to complement the direction indicator function (indicator light). Furthermore, a reflector **9** completes the whole of the first additional area **30**.

[0064] Regardless of the embodiment chosen for the signalling device **21**A, **21**B, the display means is designed to display a detailed pictogram that is clearly visible to a road user, both at night and during the day. Without limitation, four exemplary embodiments of such display means **22**A, **22**B are described hereinafter.

[0065] According to a first embodiment of the display means **22**A, **22**B, not shown in the figures, each display means is a liquid-crystal, plasma or light-emitting diode screen, the display area **24**A, **24**B of the signalling device **21**A, **21**B being that of the screen.

[0066] According to a second embodiment of the display means **22**A, **22**B, not shown in the figures, the display means **22**A, **22**B comprise an areal light guide including groups of prism-type structures or cavities on one of its lateral faces. The structures are designed to return light selectively injected via one of the edges to an opposite face. There is thus a screen having areas illuminated selectively via the edges. This type of display is described for example in documents FR2994248 and US2013314944.

[0067] According to a third embodiment of the display means **22**A, **22**B shown in FIGS. **3** and **4**, the display means **22**A, **22**B comprise at least one laser source **32**, for example a laser diode with or without a photoluminescent element, able to form a laser beam, a transmission surface **34** defining the display area **24**A, **24**B, and scanning means **36** configured to scan the transmission surface **34** with the laser beam. The transmission surface **34** is for example arranged on a closing outer lens **38** of the light. The laser beam that comes from the laser source **32** is intended to illuminate the transmission surface **34**.

[0068] The laser beam projects a luminous trace, in the shape of a point, onto the transmission surface **34**. The scanning of the luminous trace is performed by the scanning means **36** at a speed high enough that the human eye does not see its movement over the transmission surface **34**.

[0069] In this case, the scanning means **36** are a mobile micromirror that makes it possible to scan the transmission surface **34** by reflecting the laser beam. The micromirrors mentioned as scanning means are, for example, of MEMS (microelectromechanical system) type. However, the invention is in no way limited to this scanning means, and may use other types of scanning means, such as a series of mirrors arranged on a rotary element, the rotation of the element causing the transmission surface to be scanned by the laser beam.

[0070] The scanning of the laser beam by the scanning means **36** allows pictograms to appear on the transmission surface **34**, the scanning means **36** being controlled by a control unit, for example.

[0071] According to a fourth embodiment of the display means, not shown, the display means comprise at least one light source formed of at least one light-emitting diode, a transmission surface defining the display area, and an array of micromirrors configured to reflect the light rays coming from the at least one light source towards the transmission surface. The transmission surface is for example arranged on the closing outer lens of the light or else is formed by a translucent screen situated behind this closing outer lens. The light beam that comes from the light source is intended to illuminate the transmission surface.

[0072] In this last embodiment, the display means comprise an array of micromirrors (also known under the acronym DMD for digital micromirror device), which

directs the light rays by reflection. The light rays are reflected in two possible directions: either towards the focusing optical system or in a direction other than the focusing optical system.

[0073] Regardless of the embodiment of the display means, the latter is configured to selectively display each of the pictograms from a list of a plurality of predetermined pictograms, each predetermined pictogram being representative of a determined situation. FIGS. **5**A to **5**E show a few examples of pictograms able to be displayed alternately on the display area **24**A, **24**B, and two types of which are distinguished between, for example.

[0074] Generally, a pictogram is a graphical sign representative of a situation whose meaning is able to be understood quickly. The pictogram includes a stylized figurative drawing and/or alphanumeric symbols.

[0075] Some pictograms warn of an emergency or hazardous situation, for example a directional arrow as illustrated in FIG. **5**A, a pedestrian crossing in front of the vehicle as illustrated in FIG. **5**B, an exclamation mark warning of a hazard as illustrated in FIG. **5**C, a warning of an opening door as illustrated in FIG. **5**D, or else a warning to comply with the safe distance as illustrated in FIG. **5**E. Hereinafter, the invention will relate more particularly to a method for displaying the pictogram representative of the imminent opening of a door of the vehicle, one example of which is illustrated in FIG. **5**D and which will be denoted by the reference **40** in the remainder of the description.

[0076] The display of some pictograms may be dynamic, by modifying the size thereof, the movement thereof and the flashing thereof. For example, the pictogram relating to the imminent opening of a door of the vehicle may be formed of a sequence of images depicting a door opening.

[0077] One exemplary embodiment of the signalling device **21**A, **21**B and of the operation thereof is illustrated in FIG. **6**. In addition to the display means **22**A, **22**B, the signalling device **21**A, **21**B in this case comprises an electronic control unit **46** and sensors **48** on board the vehicle **20**. The sensors **48** are configured to detect or calculate certain parameters. All of these sensors **48** are linked to the electronic control unit **46** so as to provide these parameters to it.

[0078] The electronic control unit **46** is configured to automatically control the display of a pictogram representative of a determined situation on the basis of the parameters measured by the sensors **48**. To this end, it develops display orders that it transmits to the display means **22**A, **22**B.

[0079] The electronic control unit **46** includes for example a memory in which a list of predetermined pictograms is stored. The electronic control unit **46** selects the program to be displayed from the pictogram list on the basis of the situation. It may also dynamically change the design of the pictogram on the basis of these parameters.

[0080] In the corresponding embodiment, the electronic control unit **46** also sends commands to the additional means **26** so as to coordinate them with the display means **22**A, **22**B for displaying the pictogram. Thus, the pictogram beam and the additional beam are coordinated so as to fulfil the regulatory photometric characteristics.

[0081] In the case of a pair of signalling devices **21**A, **21**B, each display means **22**A, **22**B is able to be controlled independently of one another by the electronic control unit **46**.

[0082] According to the teaching of the invention, the display means **22**A, **22**B described above are used to warn third parties, for example pedestrians or bicycles, of the imminent opening of a door of the vehicle **20** by automatically displaying the pictogram **40** representative of the imminent opening of a door of the vehicle.

[0083] FIG. **7** shows a schematic plan view of the passenger compartment of the vehicle **20**. This is a motor vehicle **20**.

[0084] The passenger compartment is in this case closed by doors **50**, and more particularly by two front doors **50**A, **50**B and two rear doors **50**C, **50**D.

[0085] Each door **50**A, **50**B, **50**C, **50**D includes an interior control element for opening the doors, which is in this case formed for example by an associated interior handle **51** intended to actuate the opening of the associated door.

[0086] As a variant, the interior control element for opening a door is formed by a switch arranged at a distance from the door, for example a touchscreen or a button arranged on the dashboard of the vehicle.

[0087] Each door **50** is adjacent to a seat **52** of the vehicle **20**. Each seat **52**A, **52**B, **52**C, **52**D is in this case formed by a seat cushion.

[0088] Each seat **52**A, **52**B, **52**C, **52**D is in this case equipped with a safety belt **54**, only the safety belt of the front right-hand seat **52**B being shown for the sake of clarity.

[0089] The vehicle **20** illustrated in FIG. **7** also incorporates a display system **60** produced according to the teaching of the invention. The display system **60** comprises:

- **[0090]** a display means **22**A, **22**B comprising a display area **24**A, **24**B intended to be arranged on the vehicle **20** so as to be visible to third parties outside the vehicle;
- **[0091]** at least one device for detecting parameters representative of the imminent opening of a door **50** of the vehicle **20**;
- **[0092]** an electronic control unit for controlling the display means **22**A, **22**B and that is connected to the detection device and to the display means **22**A, **22**B in order to be able to control the display of a pictogram representative of the imminent opening of a door **50** of the vehicle **20** on the basis of the detected parameters representative of the opening of a door **50** of the vehicle **20**.

[0093] The device(s) for detecting parameters representative of the imminent opening of a door **50** of the vehicle **20** are chosen from the following list:

- **[0094]** a speed sensor of the vehicle **20**;
- **[0095]** a manual control element for turning off an engine of the vehicle;
- **[0096]** a timer measuring the time that has elapsed starting from the turning off of the engine of the vehicle;
- **[0097]** a sensor **48**B for sensing the presence of a hand of an occupant of the vehicle **20** close to or in contact with an interior control element **51** for opening a door **50**;
- **[0098]** a device for detecting the buckle state of a safety belt **54** fitted in the vehicle **20**;
- **[0099]** a sensor for sensing the presence of an occupant on a seat **52** of the vehicle **20**;
- **[0100]** a geolocation device of the vehicle **20**;
- **[0101]** an automatic parking assistance device of the vehicle **20**. With reference to the block diagram of FIG. **8**, the method includes a first step "E**1**" of determining

the imminent opening of a door **50** of the vehicle, during which the electronic control unit **46** checks that one or more parameters representative of the imminent opening of a door **50** of the motor vehicle **20** fulfil predetermined conditions. The parameters are measured by detection devices formed by appropriate sensors **48** in a step "E**0**" prior to step "E**1**".

[0102] When the predetermined conditions are fulfilled, a second step "E**2**" of developing a display order is automatically triggered. During this second step "E**2**", the electronic control unit **46** emits an order to display a pictogram **40** representative of the imminent opening of a door **50** of the vehicle **20** on at least one of the display means **22**A, **22**B.

[0103] There is provision for the pictogram **40** representative of the imminent opening of a door **50** of the vehicle **20** to remain displayed on the display means in question until a door **50** has been closed again and/or for a predetermined display duration.

[0104] According to a first embodiment of the method, a parameter representative of the imminent opening of a door **50** of the vehicle **20** is formed by the parking state of the vehicle **20**.

[0105] In this first embodiment, an associated condition "C**1**" to be fulfilled in the first step "E**1**" is for the engine to change from the turned-on state to the turned-off state. Specifically, when the driver turns the engine off, it is highly probable that one of the occupants of the vehicle **20** will open an associated door **50** in order to get out within a relatively short time.

[0106] This parameter is detected for example by the actuation of a manual control element, activated by the driver, for turning off the engine. This involves for example turning a contact key or, in the case of vehicles **20** without a contact key, actuating a manual control element such as a button.

[0107] As a variant, the condition for turning off the engine is fulfilled when the driver removes the contact key.

[0108] According to one variant of this first embodiment, this first condition "C**1**" relating to the parking state of the vehicle **20** may be supplemented by a second condition "C**2**" formed by a time delay being reached or exceeded, starting from the turning off of the engine of the vehicle, as measured for example by a timer. Thus, a second parameter representative of the imminent opening of a door **50** of the vehicle **20** is formed by the time that has elapsed since the turning off of the engine. The second step "E**2**" of developing the display order is then triggered only when the two conditions "C**1**" and "C**2**" are fulfilled at the same time.

[0109] In this first embodiment, the parameters chosen to detect the imminent opening of a door **50** of the vehicle **20** do not make it possible to detect the side of the vehicle **20** on which a door **50** will open. In this case, the electronic control unit **46** emits a simultaneous display order to the display means **22**A, **22**B of the two signalling devices **21**A, **21**B so as to attract the attention of third parties approaching the motor vehicle **20** from the right-hand side and from the left-hand side.

[0110] As a variant, the display order will be sent only to the display means **22**A situated on the side of the driver, or to the means situated on the driver side when the vehicle includes display means arranged on the side or at the front of the vehicle.

[0111] This first embodiment makes it possible to achieve the display of the appropriate pictogram **40** when there is a strong probability of the doors **50** being opened.

[0112] According to a second embodiment of the method, the second step "E**2**" is triggered when a parking state condition of the vehicle **20** and at least one additional condition are fulfilled in combination. In comparison with the first embodiment, the method carried out according to this second embodiment thus makes it possible to reduce the probability of false alarms, that is to say of displaying the pictogram **40** representative of the imminent opening of a door **50** of the vehicle **20** without this being followed by the effective opening of a door **50**.

[0113] The first step "E**1**" includes checking at least one of the following parking state conditions of the vehicle **20**:

[0114] the first parking state condition "C**1**" is that the engine of the vehicle **20** is turned off; and/or

[0115] the second parking state condition "C**3**" is that the speed of the vehicle **20** is zero.

[0116] To determine the first parking state condition "C**1**", reference will be made to the description of the first embodiment.

[0117] For the parking state condition "C**3**" relating to the zero speed of the vehicle **20**, the speed parameter of the vehicle **20** is measured by a speed sensor (not shown) of the vehicle **20**. This is for example a speed sensor used to indicate the current speed of the vehicle **20** to the driver through a display on the dashboard.

[0118] Specifically, it is unlikely that the door **50** of the vehicle **20** will be opened when the vehicle **20** is moving. Furthermore, the untimely displaying of the pictogram **40** representative of the imminent opening of a door **50** of the vehicle **20** while the vehicle **20** is moving risks disrupting the road users following the vehicle **20**.

[0119] Taking into account one of the parking state conditions "C**1**" or "C**3**" taken alone makes it possible to determine a situation in which an occupant of the vehicle **20** is liable to open a door **50** imminently.

[0120] In order to be able to determine the imminent opening of a door **50** of the vehicle **20** with greater accuracy, at least one of these first parking state conditions "C**1**" and/or "C**3**" of the vehicle **20** is combined with at least one of the following additional conditions, such that the second step "E**2**" of the method is triggered.

[0121] A first additional condition "C**4**" to be fulfilled, in combination with at least one of the parking state conditions "C**1**" and/or "C**3**", is that a hand is detected close to or in contact with an interior control element for opening the door **50** of the vehicle **20**. This parameter is detected by at least one presence sensor **48**A arranged in the vehicle **20**.

[0122] Advantageously, the presence sensor(s) **48**A are able to identify the door **50** of the motor vehicle **20** that is going to be opened. This is for example the case when the internal opening control element is formed by an interior handle **51** that is individually associated with a door **50**.

[0123] As a variant, the invention is able to be applied to remote internal opening control elements formed by one or more switches controlling the opening of one or more doors.

[0124] In a first variant embodiment, this is a proximity sensor **48**A that detects the hand of an occupant of the vehicle **20** a short distance away from the internal control element for opening the door, before this hand touches it.

[0125] The proximity sensor **48**A is for example formed by at least one camera arranged inside the vehicle **20**, for

example on the ceiling at the central rear-view mirror. This camera **48**A makes it possible to detect the presence of a mobile element, in particular the hand of an occupant, close to the interior handle **51** of each of the two front doors **50**A, **50**B, for example using image analysis means.

[0126] In the example shown in FIG. **7**, a second camera **48**A is arranged on the ceiling between the two rear doors **50**C, **50**D so as to be able to detect the approach of the hand of an occupant towards an interior handle **51** of said rear doors **50**C, **50**D.

[0127] According to one variant, not shown, the proximity sensor is formed by a capacitive sensor or else by an infrared sensor. In this case, each door of the vehicle is advantageously equipped with an associated proximity sensor.

[0128] According to a second variant, not shown, of this embodiment, the presence sensor is formed by a contact sensor that is arranged in the interior handle **51** of each door **50** of the vehicle **20** and that detects contact of a hand on the interior handle **51**. This is for example a pressure sensor.

[0129] As a variant, the presence sensors are arranged so as to detect the approach or contact of a hand on an interior handle for only some of the doors **50** of the vehicle, for example the front doors **50**A, **50**B or the rear doors **50**C, **50**D.

[0130] In any case, when at least one of the parking state conditions "C**1**", "C**3**" and the additional condition "C**4**" of detecting a hand close to the interior handle of a door **50** are fulfilled, the second step "E**2**" is triggered.

[0131] This condition of detecting a hand close to the interior handle makes it possible to identify the side of the vehicle **20** on which a door **50** will open. The electronic control unit **46** advantageously emits a display order to the display means of the signalling device **21**A, **21**B situated on the side of said door **50** about to be opened so as to attract the attention of third parties approaching the side thereof.

[0132] A second additional condition "C**5**" relates to the parameter formed by the buckle state of a safety belt **54**. This second additional condition "C**5**" is that the safety belt **54** changes from a buckled state to an unbuckled state.

[0133] To this end, the safety belts **54** of the motor vehicle **20** are provided with associated sensors **48**B, which are already well known in the context of safety devices that ensure that the occupants of the motor vehicle **20** are correctly secured when the motor vehicle **20** begins to move.

[0134] Advantageously, all of the safety belts **54** fitted to one of the seats **52** adjacent to a door **50** are equipped with such a sensor **48**B.

[0135] When at least one of the state conditions "C**1**", "C**3**" of the vehicle **20** and the second additional condition "C**5**" are combined, the second step "E**2**" of the method is triggered, during which the electronic control unit **46** emits an order to display the pictogram **40** representative of the imminent opening of a door **50** of the vehicle **20** on the side corresponding to the side on which the safety belt **54** has been detected as being unbuckled by the sensor **48**B.

[0136] A third additional condition "C**6**" relates to the parameter formed by the detection of a passenger on his seat **52**. This third additional condition "C**6**" is fulfilled when the presence of a weight, presumed to be a person, greater than a determined threshold is detected on at least one of the seats **52** of the vehicle **20**.

[0137] To measure this parameter, the cushion of at least one of the seats of the vehicle **20** is equipped with a weight sensor **48**C. Advantageously, each seat of the vehicle **20** is individually equipped with such a weight sensor **48**C. A plurality of sensors **48**C are fitted in the vehicle **20** so as to ensure that all of the vehicle **20** occupants have buckled their safety belt **54**.

[0138] This third additional condition "C**6**" advantageously makes it possible to detect the seats **52** of the vehicle **20** that are occupied. This makes it possible in particular to display the pictogram **40** for imminent opening of a door **50** on the two signalling devices **21**A, **21**B when the seats **52** are occupied on both sides of the vehicle **20**, or else to display the pictogram **40** on the side corresponding to the seats **52** that are occupied when the seats situated on the other side of the vehicle **20** are unoccupied.

[0139] A fourth additional condition "C**7**" relates to the parameter formed by the locking state of the lock (not shown) of at least one door **50**. This fourth associated condition is fulfilled when the lock of at least one door **50** changes from a locked state to an unlocked state.

[0140] For a motor vehicle **20** equipped with independent locking latches for each door **50**, this fourth condition "C**7**" also makes it possible to identify the door **50** of the vehicle **20** that is unlocked.

[0141] By contrast, when the vehicle **20** is equipped with a central locking device, this fourth condition "C**7**" has to be associated with at least one of the other additional conditions "C**4**" to "C**6**" in order to make it possible to identify the side on which the door **50** will open.

[0142] When the vehicle is equipped with a geolocation device (not shown) that includes a user interface by way of which the driver is able to enter at least one destination determined by the driver, a fifth associated condition "C**8**" to be fulfilled in the first step "E**1**" is that the vehicle has reached the determined destination.

[0143] Such geolocation devices are better known under their acronym GPS for global positioning system. These well-known devices allow the user to enter a destination to be reached, the geolocation device then making it possible to establish a path for guiding the driver to his destination.

[0144] Such a device also allows the driver to enter common stored destination addresses, such as a home address.

[0145] A parameter representative of the imminent opening of a door **50** of the vehicle **20** is thus formed by the geographical location, detected by the geolocation device, of the vehicle. When the vehicle reaches a destination following guidance, or else when the vehicle is parked close to an address stored in the memory of the geolocation device, the condition "C**8**" is considered to be fulfilled.

[0146] Some vehicles **20** are equipped with an automatic parking assistance device (not shown). This makes it possible to control the drive train of the vehicle automatically in order to park the vehicle in a space detected by obstacle detection systems such as radars, lidars or else cameras.

[0147] A parameter representative of the imminent opening of a door **50** of the vehicle **20** is formed by the actuation of the parking assistance device. The associated condition "C**9**" to be fulfilled in the first step "E**1**" is that the parking assistance device has been actuated. For example, at the end of parking by actuation of the parking assistance device, when the vehicle is stationary in its parking space.

[0148] The invention covers the alternate or cumulative combination of the various parking conditions "C**1**" and/or "C**3**" with at least one of the additional conditions "C**4**" to "C**9**".

[0149] A few exemplary combinations of conditions "C**1**" to "C**9**", able to be used by the method carried out according to the teaching of the invention, will be given hereinafter without limitation.

[0150] According to a first exemplary implementation of this second embodiment, the first step "E**1**" of the method consists in checking that the following two conditions are fulfilled in combination in order to be able to trigger the second step "E**2**":

[0151] one of the parking state conditions "C**1**" or "C**3**" of the vehicle **20**, for example the zero speed condition "C**3**", and

[0152] the condition "C**4**" of detecting a hand close to the interior handle of the vehicle **20**.

[0153] This combination makes it possible to detect the side(s) on which a door **50** will open.

[0154] According to a second exemplary implementation of the second embodiment of the invention, in order to acquire a more accurate estimation of the imminent opening of the door **50** of the vehicle **20**, the first step "E**1**" of the method consists in checking that the following three conditions are fulfilled in combination in order to be able to trigger the second step "E**2**":

[0155] one of the parking state conditions "C**1**" or "C**3**" of the vehicle **20**, for example the zero speed condition "C**3**", and

[0156] the condition "C**4**" of detecting a hand close to the interior handle of the vehicle **20**; and

[0157] the additional condition "C**5**" of the safety belt **54** changing from the buckled state to the unbuckled state.

[0158] This makes it possible to avoid false alarms, for example when the hand of an occupant inadvertently passes close to the interior handle of a door **50**. The addition of the condition "C**5**" regarding the safety belt makes it is possible to focus more particularly on the doors **50** on the side of which an occupant is ready to get out.

[0159] According to a third exemplary implementation of the second embodiment of the invention, the first step "E**1**" of the method consists in checking that the following four conditions are fulfilled in combination in order to be able to trigger the second step "E**2**":

[0160] one of the parking state conditions "C**1**" or "C**3**" of the vehicle **20**, for example the zero speed condition "C**3**", and

[0161] the condition "C**4**" of detecting a hand close to the interior handle of the vehicle **20**; and

[0162] the condition "C**6**" of detecting occupation of certain seats **52**; and

[0163] the condition "C**5**" relating to the fact that the safety belt **54** of at least one of the occupied seats **52** is not buckled.

[0164] This variant makes it possible to take into account the case of occupants of the vehicle **20** not having secured their safety belt **54**, these occupants thus being ready to get out of the vehicle **20**.

[0165] According to a fourth exemplary implementation of the second embodiment of the invention, the first step "E**1**" of the method consists in checking that the following two conditions are fulfilled in combination in order to be able to trigger the second step "E**2**":

[0166] one of the parking state conditions "C**1**" or "C**3**" of the vehicle **20**, for example the zero speed condition "C**3**", and

[0167] the additional condition "C**5**" of the safety belt **54** changing from the buckled state to the unbuckled state.

[0168] This fourth example, which is a simplified version of the second example, is particularly suitable for vehicles **20** without a sensor **48**B for sensing the presence of a hand close to or in contact with the interior handle of the door **50**.

[0169] Of course, these four examples are nonlimiting, and other combinations of the conditions described above may be contemplated.

[0170] There may also be provision not to apply the method to doors **50** of which a safety system, called "child safety", for preventing opening by way of the interior handle, is activated.

[0171] The method will be more effective, for example by triggering fewer false alarms, when the first step "E**1**" includes a large number of conditions to be fulfilled in combination in order to be able to trigger the second step "E**2**".

[0172] However, it is also possible to contemplate simplified versions of the method, such as described for example in the first embodiment or in the fourth example of the second embodiment, in particular when the vehicle **20** is not equipped with appropriate sensors for checking that other additional conditions are met.

[0173] The method carried out according to the teaching of the invention thus makes it possible to warn third parties of the imminent opening of a door **50** of the vehicle **20**. This allows third parties to anticipate the opening of a door **50**, independently of the vigilance of the occupant opening said door **50**.

[0174] The method applied to the signalling device **21**A, **21**B described above makes it possible to display a pictogram **40** that complies with the regulatory obligations in respect of signalling lights. Thus, when the stop lights or the position lights of the vehicle **20** are turned on, the pictogram **40** contributes to, or even completely produces, said regulatory function.

[0175] Furthermore, some embodiments of the method make it possible to indicate the side on which a door **50** will open, so as to selectively display the pictogram **40** representative of the imminent opening of a door **50** of the vehicle **20** on said side.

[0176] In the variant embodiment in which the vehicle includes a single display means arranged at the rear of the vehicle, a single display means receives the display order.

[0177] When the motor vehicle includes at least one display means that is arranged on the side and/or at the front of the vehicle, the display means are controlled either simultaneously or on the basis of the side on which the door opens, when this is possible. This thus makes it possible to warn third parties who are approaching from in front of the vehicle or who are already level with the vehicle of the imminent opening of a door of the vehicle **20**.

1. Method for controlling a display means on board a motor vehicle, the display means including a display area visible from outside the vehicle, the display means being configured to selectively display each of the pictograms from a list of a plurality of predetermined pictograms, each predetermined pictogram being representative of a determined situation,

wherein the method includes:

a first step of determining the imminent opening of a door of the vehicle, during which it is checked that

at least one parameter representative of the imminent opening of a door of the motor vehicle fulfils at least one predetermined condition,

a second step of developing a display order that is triggered when the predetermined conditions are fulfilled, and during which an order to display a pictogram representative of the imminent opening of a door of the vehicle on the display means is emitted by an electronic control unit.

2. Method according to claim **1**, wherein a first parameter representative of the imminent opening of a door of the vehicle is formed by the speed of the vehicle, an associated condition to be fulfilled in the first step being that the speed of the vehicle is zero.

3. Method according to claim **1**, wherein a second parameter representative of the imminent opening of a door of the vehicle is formed by the operating state of the engine of the vehicle, an associated condition to be fulfilled in the first step being that the engine changes from the turned-on state to the turned-off state.

4. Method according to claim **3**, wherein a third parameter representative of the imminent opening of a door of the vehicle is formed by the time that has elapsed since an engine of the vehicle was turned off, an associated condition to be fulfilled in the first step being that a time delay has been exceeded, starting from the turning off of the engine of the vehicle.

5. Method according to claim **1**, wherein the motor vehicle includes a sensor for sensing the presence of a hand of an occupant of the vehicle close to or in contact with an interior control element for opening the door, a fourth parameter representative of the imminent opening of a door of the vehicle being formed by the presence of a hand close to or in contact with the interior opening control element, an associated condition to be fulfilled in the first step being the presence of a hand close to the interior opening control element being detected.

6. Method according to claim **5**, wherein the presence sensor is formed by at least one camera.

7. Method according to claim **5**, wherein the presence sensor is formed by at least one infrared sensor arranged close to the interior opening control element.

8. Method according to claim **5**, wherein the proximity sensor is formed by at least one capacitive sensor arranged close to the interior opening control element.

9. Method according to claim **1**, wherein a parameter representative of the imminent opening of a door of the vehicle is formed by the buckle state of a safety belt fitted in the vehicle, an associated condition to be fulfilled in the first step being that the safety belt changes from a buckled state to an unbuckled state.

10. Method according to claim **1**, wherein a parameter representative of the imminent opening of a door of the vehicle is formed by the detection of an occupant on his seat, an associated condition to be fulfilled in the first step being that a weight greater than a determined threshold is detected on said seat.

11. Method according to claim **1**, wherein a parameter representative of the imminent opening of a door of the vehicle is formed by the locking state of a lock of at least one door, an associated condition to be fulfilled in the first step being that the lock of at least one door changes from a locked state to an unlocked state.

12. Method according to claim **1**, wherein the vehicle is equipped with a geolocation device into which the driver is able to enter at least one destination determined by the driver, a parameter representative of the imminent opening of a door of the vehicle being formed by the geographical location, detected by the geolocation device, of the vehicle, an associated condition to be fulfilled in the first step being that the vehicle has reached the determined destination.

13. Method according to claim **1**, wherein the vehicle is equipped with an automatic parking assistance device, a parameter representative of the imminent opening of a door of the vehicle being formed by the actuation of the parking assistance device, an associated condition to be fulfilled in the first step being that the parking assistance device has been actuated.

14. Method according to claim **5**, wherein the motor vehicle includes two display means that are each arranged on a side of the vehicle, at least one of the parameters representative of the imminent opening of a door of the vehicle being able to detect the side on which the door whose opening is imminent is situated, the display order developed in the second step being sent only to the display means arranged on the same side as said door whose imminent opening was detected in the first step.

15. Method according to claim **1**, wherein the rear of the motor vehicle includes a single display means.

16. Method according to claim **1**, wherein the motor vehicle includes at least one display means that is arranged on the side and/or at the front of the vehicle.

17. System for displaying at least one pictogram on a motor vehicle, comprising:

a display means comprising a display area intended to be arranged on the vehicle so as to be visible from outside the vehicle;

at least one device for detecting parameters representative of the imminent opening of a door of the vehicle;

an electronic control unit for controlling the display means and that is connected to the detection device and to the display means in order to be able to control the display of a pictogram representative of the imminent opening of a door of the vehicle on the basis of the detected parameters representative of the opening of a door of the vehicle.

18. Display system according to claim **17**, wherein each device for detecting parameters representative of the imminent opening of a door of the vehicle is chosen from the following list:

a speed sensor of the vehicle;

a manual control element for turning off an engine of the vehicle;

a timer measuring the time that has elapsed starting from the turning off of the engine of the vehicle;

a sensor for sensing the presence of a hand of an occupant of the vehicle close to or in contact with an interior control element for opening a door;

a device for detecting the buckle state of a safety belt fitted in the vehicle;

a sensor for sensing the presence of an occupant on a seat of the vehicle;

a geolocation device of the vehicle;

an automatic parking assistance device of the vehicle.

19. Motor vehicle comprising a display system according to claim **17**.

20. Method according to claim **2**, wherein a second parameter representative of the imminent opening of a door of the vehicle is formed by the operating state of the engine of the vehicle, an associated condition to be fulfilled in the first step being that the engine changes from the turned-on state to the turned-off state.

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