



- (51) **International Patent Classification:**
B60W 30/08 (2012.01) *G08G 1/16* (2006.01)
- (21) **International Application Number:**
PCT/SE2013/050772
- (22) **International Filing Date:**
26 June 2013 (26.06.2013)
- (25) **Filing Language:** Swedish
- (26) **Publication Language:** English
- (30) **Priority Data:**
1250747-1 2 July 2012 (02.07.2012) SE
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- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

- (54) **Title:** DEVICE AND METHOD FOR ASSESSING RISKS TO A MOVING VEHICLE

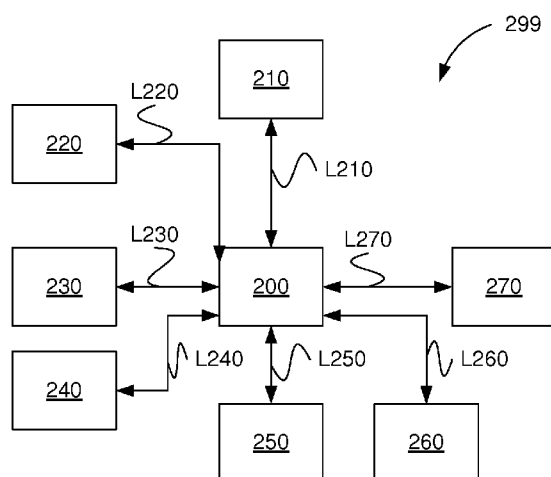


Fig. 2

(57) **Abstract:** The invention relates to a method for assessing accident risks to a moving vehicle (100; 110) comprising the steps of - continuously monitoring (s410) a surroundings configuration while said vehicle (100; 110) is in motion, - continuously determining (s420) running characteristics for the vehicle (100; 110), - continuously registering (s430) said surroundings configuration in order to create and provide an idea about chosen characteristics of the surroundings passed by the vehicle, - using said running characteristics and said idea as a basis for assessing (s440) accident risks related to the surroundings passed by the vehicle (100; 110). The invention relates also to a computer programme product comprising programme code (P) for a computer (200; 210) for implementing a method according to the invention. The invention relates also to a device and a vehicle equipped with the device.

Device and method for assessing accident risks to a moving vehicle

TECHNICAL FIELD

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The present invention relates to a method for assessing accident risks to a moving vehicle. The invention relates also to a computer programme product comprising programme code for a computer for implementing a method according to the invention. The invention also relates to a device for
10 assessing accident risks to a moving vehicle and a vehicle equipped with the device.

BACKGROUND

15 During operation of vehicles, e.g. heavy vehicles such as trucks, there may in certain traffic situations be increased risk of colliding with various objects or structures. Collision risk may be greater during vehicle operation in densely built-up areas.

20 There are today systems which can warn a driver whose vehicle is moving closer to a vehicle ahead. In certain cases, a control system of the vehicle automatically applies braking action of vehicle brakes if there is increased risk of colliding with vehicles ahead. Vehicles are also for example provided with support systems which can actively provide warnings if a distance
25 sensor detects that a distance from the vehicle to an object is below a specified threshold value.

There is nevertheless always a need in the vehicle industry to further develop existing alarm systems in order to achieve improved traffic safety.

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WO 2011/157288 describes a system for detecting locations, timetables and travelling times in order to use historical journey data to estimate barrier crossings, e.g. relating to ferry traffic, using a digital map.

5 SUMMARY OF THE INVENTION

One object of the present invention is to propose a novel and advantageous method for assessing accident risks to a moving vehicle.

- 10 Another object of the invention is to propose a novel and advantageous device and a novel and advantageous computer programme for assessing accident risks to a moving vehicle.

- 15 A further object of the invention is propose a method, a device and a computer programme for achieving increased safety of a moving vehicle.

A further object of the invention is propose a method, a device and a computer programme for achieving robust and reliable assessment of risks of colliding with stationary objects.

20

These objects are achieved with a method for assessing accident risks to a moving vehicle according to claim 1.

- 25 One aspect of the invention is a proposed method for assessing accident risks to a moving vehicle, comprising the steps of

- continuously monitoring a surroundings configuration while said vehicle is in motion,
 - continuously determining running characteristics for the vehicle,
 - continuously registering said surroundings configuration in order to create
- 30 and provide an idea about chosen characteristics of surroundings passed by the vehicle, and

- using said running characteristics and said idea as a basis for assessing accident risks related to surroundings passed by the vehicle.

5 By saving and reusing information about surroundings configurations it is possible to achieve a method for assessment of risks of colliding with fixed objects. The innovative method thus provides a driver of a vehicle with a robust warning system and support for decisions.

10 Said assessment may comprise taking vehicle configurations into account, making it possible for assessments of collision risks to be conducted on the basis of configurations specific to the vehicle, resulting in further increased safety according to one aspect of the innovative method.

15 Said running characteristics may comprise coming movement paths, with the consequent advantageous possibility of predicting a future collision with a fixed object and thereby enabling a driver of the vehicle to adopt suitable measures before a potential collision.

20 Accident risks may be presented for an operator of the vehicle, making it possible to present for a driver of the vehicle a good basis for deciding on measures.

25 Said chosen characteristics of the surroundings passed by the vehicle may comprise locations and configurations of fixed objects in said surroundings, making it possible to provide a clear picture of fixed objects in a surroundings configuration which involve collision risks.

30 The method is easy to implement in existing motor vehicles. Software for assessing accident risks to a moving vehicle according to the invention may be installed in a control unit of the vehicle during the manufacture of the vehicle. A purchaser of the vehicle may thus have the possibility of selecting the function of the method as an option. Alternatively, software which

comprises programme code for conducting the innovative method for assessing accident risks to a moving vehicle may be installed in a control unit of the vehicle on the occasion of upgrading at a service station, in which case the software may be loaded into a memory in the control unit. Implementing
5 the innovative method is therefore cost-effective, particularly since no further sensors or components need be installed in the vehicle, according to one aspect of the invention. Relevant hardware may today already be provided on board the vehicle. The invention therefore represents a cost-effective solution to the problems indicated above.

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Software which comprises programme code for assessing accident risks to a moving vehicle is easy to update or replace. Moreover, different parts of the software which comprises programme code for assessing accident risks to a moving vehicle may be replaced independently of one another. This modular
15 configuration is advantageous from a maintenance perspective.

One aspect of the invention is a proposed device for assessing accident risks to a moving vehicle, comprising

- means for continuously monitoring a surroundings configuration while said
20 vehicle is in motion,
- means for continuously determining running characteristics for the vehicle,
- means for continuously registering said surroundings configuration in order to create and provide an idea about chosen characteristics of the surroundings passed by the vehicle, and
- 25 - means for using said running characteristics and said idea as a basis for assessing accident risks related to the surroundings passed by the vehicle.

Said means for assessing accident risks may be adapted to taking said vehicle configurations into account.

30

Said running characteristics may comprise coming movement paths. Said chosen characteristics of the surroundings passed by the vehicle may comprise locations and configurations of fixed objects in said surroundings.

- 5 The device may further comprise means for presenting accident risks for an operator of the vehicle.

The above objects are also achieved with a vehicle which is provided with the device for assessing accident risks to a moving vehicle. The vehicle may be
10 a truck, bus or car.

One aspect of the invention is a proposed computer programme for assessing accident risks to a moving vehicle, which programme comprises programme code for causing an electronic control unit or another computer
15 connected to the electronic control unit to perform steps according to any one of claims 1-5.

One aspect of the invention is a proposed computer programme for assessing accident risks to a moving vehicle, which programme comprises
20 programme code stored on a computer-readable medium for causing an electronic control unit or another computer connected to the electronic control unit to perform steps according to any one of claims 1-5.

One aspect of the invention is a proposed computer programme product
25 comprising a programme code stored on a computer-readable medium for performing method steps according to any one of claims 1-5 when said computer programme is run on an electronic control unit or another computer connected to the electronic control unit.

30 In one aspect of the invention it is possible to use sensors directed forwards, e.g. one or more video cameras and/or cameras and/or one or more radar units. This makes it possible to reuse registered and saved data generated

by said forward-directed sensors at a later stage, e.g. when a trailer of the vehicle is passing stationary objects already detected, or when the vehicle is reversing.

- 5 The invention thus differs from existing systems in which for example an emergency brake function may be activated on the basis of information from forward-directed sensors where there is risk of collision with a movable or stationary object, when said object is still within an active visual field of the forward-directed sensors.

10

The invention thus provides the advantageous possibility of using previously registered information about stationary objects in a surroundings configuration in situations where said sensors do not have said objects in any of their visual fields.

15

Further objects, advantages and novel features of the present invention will become apparent to one skilled in the art from the following details, and also by putting the invention into practice. Whereas the invention is described below, it should be noted that it is not confined to the specific details described. One skilled in the art having access to the teachings herein will recognise further applications, modifications and incorporations within other fields, which are within the scope of the invention.

20

BRIEF DESCRIPTION OF THE DRAWINGS

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For fuller understanding of the present invention and its further objects and advantages, the detailed description set out below should be read in conjunction with the accompanying drawings, in which the same reference notations are used for similar items in the various diagrams,

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Figure 1 schematically illustrates a vehicle according to an embodiment of the invention,

Figure 2 schematically illustrates a subsystem for the vehicle depicted in Figure 1, according to an embodiment of the invention,

Figure 3a schematically illustrates a first example of a traffic situation,

Figure 3b schematically illustrates a second example of a traffic situation,

5 Figure 4a is a schematic flowchart of a method according to an embodiment of the invention,

Figure 4b is a more detailed schematic flowchart of a method according to an embodiment of the invention, and

10 Figure 5 schematically illustrates a computer according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE DRAWINGS

15 Figure 1 depicts a side view of a vehicle 100. The vehicle here exemplified comprises a tractor unit 110 and a trailer 112. It may be a heavy vehicle, e.g. a truck or a bus. It may alternatively be a car.

The term “link” refers herein to a communication link which may be a physical connection such as an opto-electronic communication line, or a non-physical
20 connection such as a wireless connection, e.g. a radio link or microwave link.

Figure 2 depicts a subsystem 299 of the vehicle 100. This subsystem is situated in the tractor unit 110 and comprises a first control unit 200.

25 The first control unit 200 is arranged for communication with a first sensor device 220 via a link L220. The first sensor device may comprise a camera unit. The camera unit may be a mono-camera. The camera unit may be a stereo-camera. Said first sensor device 220 is adapted to continuously generating images of surroundings of the vehicle 100. It may be adapted to
30 generating images of surroundings of the vehicle in real time. It is alternatively adapted to intermittently generating images of surroundings of

the vehicle. It may be adapted to continuously filming surroundings of the vehicle as a video stream.

5 The first sensor device 220 may comprise a suitable number of image-generating units which may be mutually different, e.g. as regards visual fields and other facilities. In one example said first sensor device comprises a first camera with a visual field of 45 degrees and a range of up to 100 metres, and a second camera with a visual field of 30 degrees and a range of up to 200 metres. Said first and second cameras may have suitable respective
10 visual fields and ranges. The visual fields of different image-generating units may overlap in whole or in part.

Said first sensor device 220 is adapted to continuously sending said images generated to the first control unit 200 via the link L220. Said first sensor
15 device is adapted to continuously sending said video stream generated to the first control unit via the link L220.

The first control unit 200 is arranged for communication with a second sensor device 230 via a link L230. Said second sensor device may comprise a radar
20 unit. The radar unit may be a mono-radar. It may be a stereo-radar. Said second sensor device is adapted to continuously generating radar images of surroundings of the vehicle 100. It may be adapted to generating radar images of surroundings of the vehicle in real time. Said second sensor device is alternatively adapted to intermittently generating radar images of
25 surroundings of the vehicle.

The second sensor device 230 may comprise a suitable number of radar units which may be mutually different, e.g. as regards visual field and other facilities. In one example said second sensor device comprises a first radar
30 unit with a visual field of 50 degrees and a range of up to 60 metres, and a second radar unit with a visual field of 10 degrees and a range of up to 120 metres. Said first and second radar units may have respective suitable visual

fields and ranges. The visual fields of different radar units may overlap in whole or in part.

Said second sensor device 230 is adapted to continuously sending said radar
5 images generated to the first control unit 200 via the link L230.

The first control unit 200 is adapted to receiving signals comprising data from said first sensor device 220 and said second sensor device 230.

10 The first control unit 200 is adapted to processing said signals received from said first sensor device 220 in order to detect a surroundings configuration comprising information about the locations and configurations of fixed objects. Said fixed objects may for example be a sidewalk edge or a freight
loading platform. They may be road signs, central reservations, buildings,
15 parked vehicles etc. Said first control unit is adapted to storing said images received and/or said surroundings configuration detected in a memory with which it is provided.

The first control unit 200 is adapted to processing said signals received from
20 said second sensor device 230 in order to detect a surroundings configuration comprising information about the locations and configurations of fixed objects. Said fixed objects may for example be a sidewalk edge or a freight loading platform. They may be road signs, central reservations, buildings, parked vehicles etc. Said first control unit is adapted to storing said
25 images received and/or said surroundings configuration detected in a memory with which it is provided.

Alternatively, image processing may be performed by said first sensor device 220 and/or said second sensor device 230, in which case either or both of
30 them may detect said surroundings configuration and pass information about it on to the first control unit via the respective links L220, L230.

The first control unit 200 is arranged for communication with positioning means 240 via a link L240. Said positioning means are adapted to continuously determining a prevailing location of the vehicle. They may comprise a GPS receiver. They may comprise a suitable gyro device. Said positioning means are adapted to continuously determining a prevailing orientation of the vehicle, e.g. relative to a north direction. They are adapted to continuously sending signals containing information about a prevailing location and orientation of the vehicle to the first control unit via the link L240.

10 The first control unit 200 is arranged for communication with a third sensor device 250 via a link L250. Said third sensor device is adapted to continuously determining a number of different vehicle parameters which may comprise the vehicle's prevailing yaw angle, prevailing yaw rate, prevailing steering wheel angle, prevailing vehicle speed, prevailing wheel speed etc. Said vehicle parameters may be used by the first control unit to calculate running characteristics for the vehicle. The first control unit is thus adapted to calculating a coming movement path for the vehicle. A coming probable movement path may thus be predicted. Said first control unit is adapted to calculating said running characteristics on the basis of at least one vehicle parameter.

The first control unit 200 is arranged for communication with a communication unit 260 via a link L260. Said communication unit may comprise a suitable user interface which enables an operator of the vehicle to input for example information about vehicle configurations, which may comprise information about the vehicle's total length, type of trailer 112, any overhang etc. An operator of the vehicle may where appropriate update information about vehicle configurations to make it possible to make proper assessments of accident risks to a moving vehicle. Said communication unit may comprise a set of push-buttons, viewing screen, touchscreen or other suitable means for interacting with the first control unit. In one example

necessary information about vehicle configurations is pre-stored in a memory of the first control unit.

5 The first control unit 200 is arranged for communication with feedback means 270 via a link L270. Said feedback means may be integrated with said communication unit 260 or constitute a separate unit. They may comprise a viewing screen, loudspeakers or light devices. The first control unit is adapted to making an operator of the vehicle aware that there is an accident risk to the moving vehicle.

10

In one embodiment said feedback means 270 may be adapted to presenting by means of said viewing screen an image representing the vehicle and illustrating an area of the vehicle where there is risk of collision with a fixed object.

15

In one embodiment said feedback 270 means may be adapted to delivering by means of said loudspeakers an auditory signal when there is risk of collision with a fixed object. Said auditory signal may comprise synthesised speech or a continuous or intermittent sound signal.

20

In one embodiment said feedback means 270 may be adapted to delivering a continuous or intermittent light signal, e.g. by means of a lamp or LED, when there is risk of collision with a fixed object.

25 A second control unit 210 is arranged for communication with the first control unit 200 via a link L210. Said second control unit may be detachably connected to the first control unit. It may be external to the vehicle. It may be adapted to conducting the innovative method steps according to the invention. It may be used to cross-load software to the first control unit,
30 particularly software for conducting the innovative method. It may alternatively be arranged for communication with the first control unit via an internal network on board the vehicle. It may be adapted to performing

functions substantially similar to the first control unit, e.g. to using the signals received comprising surroundings images (e.g. video or radar images) which contain information about surroundings configurations, information concerning the location and orientation of the vehicle, and running
5 characteristics, as a basis for assessing accident risks to a moving vehicle.

Figure 3a illustrates schematically a first example of a traffic situation. It shows the vehicle 100 at a first time T1 and a subsequent second time T2. A driver of the vehicle here intends to execute a turning manoeuvre to the right
10 in the diagram in order to go round a raised kerb 300 which may be identified as a fixed object, e.g. a sidewalk edge.

Before the first time T1, a surroundings configuration is continuously monitored while said vehicle is in motion, by means of said first sensor
15 device 220 and/or said second sensor device 230. A visual field 320 for the first sensor device at a given time is illustrated. Before the first time T1 running characteristics for the vehicle are continuously determined. Before the first time T1 said surroundings configuration is continuously registered in order to create and provide an idea about chosen characteristics of the
20 surroundings passed by the vehicle.

At the first time T1 the first control unit makes a calculation of a predicted movement path Predpath1 for the vehicle on the basis of the vehicle parameters described above. In addition, the risk of colliding with the fixed
25 object 300 is continuously calculated on the basis inter alia of vehicle configurations, predicted movement paths and surroundings configurations. The risk of colliding with the fixed object may be calculated continuously after time T1 and before the second time T2.

30 In this example the first control unit 200 determines that the driver of the vehicle seems to be executing a turning manoeuvre which will entail risk of an area C of the vehicle colliding with the fixed object 300, whereupon the

driver may be warned automatically by means of the feedback means 270 before time T2. This enables the driver to avoid said potential collision by a suitable manoeuvre, e.g. by steering further out during the turning manoeuvre and/or by braking.

5

In this context, image history, i.e. processed images generated by said first sensor device 220 and/or said second sensor device 230, serves as a basis for calculating the risk of colliding with a fixed object which has been passed by the driver. The processed images generated by said first sensor device
10 and/or said second sensor device may in one aspect of the invention be saved in a memory of the first control unit and be used at a later stage for assessing the risk of colliding with a fixed object in a surroundings configuration. Knowledge of vehicle configurations makes it possible to calculate a predicted movement path Predpath2 for critical parts of the
15 vehicle 100. This predicted movement path Predpath2 is determined in this example to be on the “wrong” side of the fixed object 300, making it possible to determine future collision risk (at time T2).

Figure 3b illustrates schematically a second example of a traffic situation. It
20 shows the vehicle 100 at a first time T1 and a subsequent second time T2. A driver of the vehicle here intends to turn and reverse towards a fixed object 350 in the form of a freight loading platform.

Before the first time T1, a surroundings configuration is continuously
25 monitored while said vehicle is in motion, by means of said first sensor device 220 and/or said second sensor device 230. A visual field 330 for the second sensor device 230 at a given time is illustrated. Before the first time T1 said surroundings configuration is continuously registered in order to create and provide an idea about chosen characteristics of the surroundings
30 passed by the vehicle.

At the second time T2 the first control unit makes a calculation of a predicted movement path Predpath1 for the vehicle on the basis of vehicle parameters as described above. In addition, the risk of colliding with the fixed object 350 is continuously calculated on the basis inter alia of vehicle configurations, predicted movement paths and surroundings configurations. After the second time T2 running characteristics for the vehicle are continuously determined. The risk of colliding with the fixed object may be calculated continuously after time T2.

In this example the first control unit determines that the driver of the vehicle seems to be executing a reversing manoeuvre which will involve risk of colliding with the fixed object 350, whereupon the driver may be warned automatically by the feedback means 270 before said potential collision takes place. The driver is thus enabled to avoid said potential collision by a suitable manoeuvre, e.g. by reversing slowly and keeping a good look-out behind.

In this context, image history, i.e. processed images generated by said first sensor device 220 and/or said second sensor device 230, serves as a basis for calculating the risk of colliding with a fixed object which has been passed by the driver. The processed images generated by said first sensor device and/or said second sensor device may in one aspect of the invention be saved in a memory of the first control unit and be used at a later stage for assessing the risk of colliding with a fixed object in a surroundings configuration. Knowledge of vehicle configurations makes it possible to calculate a predicted movement paths for critical parts (rear end of trailer) of the vehicle.

Figure 4a is a schematic flowchart of a method for assessing accident risks to a moving vehicle according to an embodiment of the invention. The method comprises a first step s401 comprising the steps of

- continuously monitoring a surroundings configuration while said vehicle is in motion,
 - continuously determining running characteristics for the vehicle,
 - continuously registering said surroundings configuration in order to create
- 5 and provide an idea about chosen characteristics of the surroundings passed by the vehicle, and
- using said running characteristics and said idea as a basis for assessing accident risks related to surroundings passed by the vehicle. The method ends after step s401.

10

Figure 4b is a schematic flowchart of a method for assessing accident risks to a moving vehicle according to an embodiment of the invention.

The method comprises a first step s410 comprising the step of continuously

15 monitoring a surroundings configuration while said vehicle is in motion. This may be performed by means of the first sensor device 220 and/or the second sensor device 230. Step s410 is followed by a step s420.

Method step s420 comprises the step of continuously determining running

20 characteristics for the vehicle. This may be performed by using said positioning means 240 and said third sensor means 250. Step s420 is followed by a step s430.

Method step s430 comprises the step of continuously registering said

25 surroundings configuration in order to create and provide an idea about chosen characteristics of the surroundings passed by the vehicle. Step s430 may comprise images of said surroundings configuration monitored being processed and being saved in a memory in the first control unit 200. Said chosen characteristics may pertain to fixed objects such as traffic signs and

30 sidewalk edges. They may be chosen manually by means of the communication unit 260 or be pre-stored in a memory in the control unit 200. Step s430 is followed by a step s440.

Method step s440 comprises the step of using said running characteristics and said idea as a basis for assessing accident risks related to surroundings passed by the vehicle. Step s440 is followed by a step s450.

5

Method step s450 comprises the step of presenting accident risks for an operator of the vehicle, e.g. by using said feedback means 270. The method ends after step s450.

10 Figure 5 is a diagram of one version of a device 500. The control units 200 and 210 described with reference to Figure 2 may in one version comprise the device 500. The device 500 comprises a non-volatile memory 520, a data processing unit 510 and a read/write memory 550. The non-volatile memory 520 has a first memory element 530 in which a computer
15 programme, e.g. an operating system, is stored for controlling the function of the device 500. The device 500 further comprises a bus controller, a serial communication port, I/O means, an A/D converter, a time and date input and transfer unit, an event counter and an interruption controller (not depicted). The non-volatile memory 520 has also a second memory element 540.

20

A proposed computer programme P comprises routines for assessing accident risks to the vehicle 100 when it is in motion, according to the innovative method.

25 The programme P comprises routines for continuously monitoring a surroundings configuration while said vehicle is in motion. It comprises routines for continuously determining running characteristics for the vehicle. It comprises routines for continuously registering said surroundings configuration in order to create and provide an idea about chosen
30 characteristics of the surroundings passed by the vehicle. It comprises routines for using said running characteristics and said idea as a basis for assessing accident risks relating to surroundings passed by the vehicle.

The programme P comprises routines for making said assessments on the basis of vehicle configurations. It comprises routines for calculating the vehicle's future movement paths. It comprises routines for presenting
5 accident risks for an operator of the vehicle. It comprises routines for making said assessments on the basis of information about locations and configurations of fixed objects in said surroundings

The programme P may be stored in an executable form or in compressed
10 form in a memory 560 and/or in a read/write memory 550.

Where it is stated that the data processing unit 510 performs a certain function, it means that it conducts a certain part of the programme stored in the memory 560 or a certain part of the programme stored in the read/write
15 memory 550.

The data processing device 510 can communicate with a data port 599 via a data bus 515. The non-volatile memory 520 is intended for communication with the data processing unit 510 via a data bus 512. The separate memory
20 560 is intended to communicate with the data processing unit via a data bus 511. The read/write memory 550 is arranged to communicate with the data processing unit via a data bus 514. The links L210, L220, L230, L240, L250, L260 and L270, for example, may be connected to the data port (see Figure 2).

25

When data are received on the data port 599, they are stored temporarily in the second memory element 540. When input data received have been temporarily stored, the data processing unit 510 will be prepared to conduct code execution as described above.

30

An electronic map may be stored in the memory 560. The vehicle's situation as regards location and orientation may be determined on the basis of

information determined by using said positioning means and/or said third sensor device.

Information about vehicle parameters and vehicle configurations may be
5 stored in the memory 560 and may be updated manually by means of said communication unit 260, which may for example take place at the time of coupling a trailer 112 to the tractor unit 110.

In one version, signals received on the data port 599 contain information
10 about an environment configuration. Said signals may be images generated by the first sensor device 220 and/or the second sensor device 230. Information about environment configurations may be saved in suitable ways in the first control unit 200. In one version, images generated by the first sensor device and/or the second sensor device are stored for one minute. In
15 one version, images generated by the first sensor device and/or the second sensor device are stored for five minutes. In one version, images generated by the first sensor device and/or the second sensor device are stored for a suitable period of time, e.g. 10 seconds, 30 seconds or 10 minutes. Said saved images may serve as a basis for assessing collision risks according to
20 one aspect of the invention.

In one version, signals received on the data port 599 contain information
about yaw angle, yaw rate, steering wheel angle, wheel speed, vehicle speed
and vehicle acceleration.
25

In one version, signals received on the data port contain information about locations determined by a positioning means 240.

The signals received on the data port 599 may be used by the device 500 for
30 assessing accident risks to a moving vehicle, according to the innovative method.

Parts of the methods herein described may be conducted by the device 500 by means of the data processing unit 510 which runs the programme stored in the memory 560 or the read/write memory 550. When the device 500 runs the programme, methods herein described are executed.

5

The foregoing description of the preferred embodiments of the present invention is provided for illustrative and descriptive purposes. It is not intended to be exhaustive, nor to limit the invention to the variants described.

Many modifications and variations will obviously suggest themselves to one skilled in the art. The embodiments have been chosen and described in order best to explain the principles of the invention and their practical applications and thereby make it possible for one skilled in the art to understand the invention for different embodiments and with the various modifications appropriate to the intended use.

15

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CLAIMS

1. A method for assessing accident risks to a moving vehicle (100; 110) comprising the steps of
 - 5 - continuously monitoring (s410) a surroundings configuration while said vehicle (100; 110) is in motion,
 - continuously determining (s420) running characteristics for the vehicle (100; 110),**characterised** by the steps of
 - 10 - continuously registering (s430) said surroundings configuration in order to create and provide an idea about chosen characteristics of the surroundings passed by the vehicle,
 - using said running characteristics and said idea as a basis for assessing (s440) accident risks related to the surroundings passed by the vehicle (100; 15 110).
2. A method according to claim 2, in which said assessment comprises taking vehicle configurations into account.
- 20 3. A method according to claim 2 or 3, in which said running characteristics comprise coming movement paths.
4. A method according to any one of the foregoing claims, in which accident risks are presented (s450) for an operator of the vehicle.
- 25 5. A method according to any one of the foregoing claims, in which said chosen characteristics of the surroundings passed by the vehicle comprise locations and configurations of fixed objects in said surroundings.
- 30 6. A device for assessing accident risks to a moving vehicle comprising
 - means for continuously monitoring a surroundings configuration while said vehicle (100; 110) is in motion,

- means for continuously determining running characteristics for the vehicle,
characterised by

- means for continuously registering said surroundings configuration in order to create and provide an idea about chosen characteristics of the
5 surroundings passed by the vehicle,
- means for using said running characteristics and said idea as a basis for assessing accident risks related to the surroundings passed by the vehicle.

7. A device according to claim 6, in which said means for assessing accident
10 risks are adapted to taking vehicle configurations into account.

8. A device according to claim 6 or 7, in which said running characteristics comprise coming movement paths.

15 9. A device according to any one of claims 6-8, further comprising means for presenting accident risks for an operator of the vehicle.

10. A device according to any one of claims 6-9, in which said chosen characteristics of the surroundings passed by the vehicle comprise locations
20 and configurations of fixed objects in said surroundings.

11. A vehicle (100; 110) provided with a device according to any one of claims 6-10.

25 12. A vehicle (100; 110) according to claim 11, in which the vehicle is any from among truck, bus or car.

13. A computer programme (P) for assessing accident risks to a moving vehicle, which programme (P) comprises programme code stored on a
30 computer-readable medium for causing an electronic control unit (200; 500) or another computer (210; 500) connected to the electronic control unit (200; 500) to perform steps according to any one of claims 1-5.

14. A computer programme product comprising a programme code stored on a computer-readable medium for performing method steps according to any one of claims 1-5 when said programme is run on an electronic control unit (200; 500) or another computer (210; 500) connected to the electronic control unit (200; 500).

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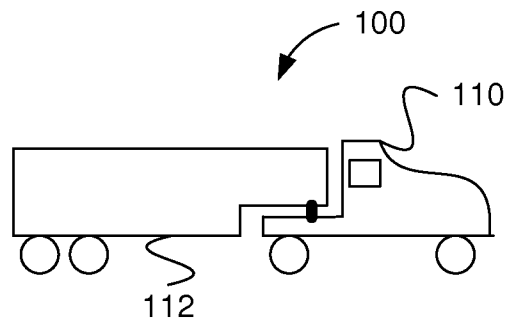


Fig. 1

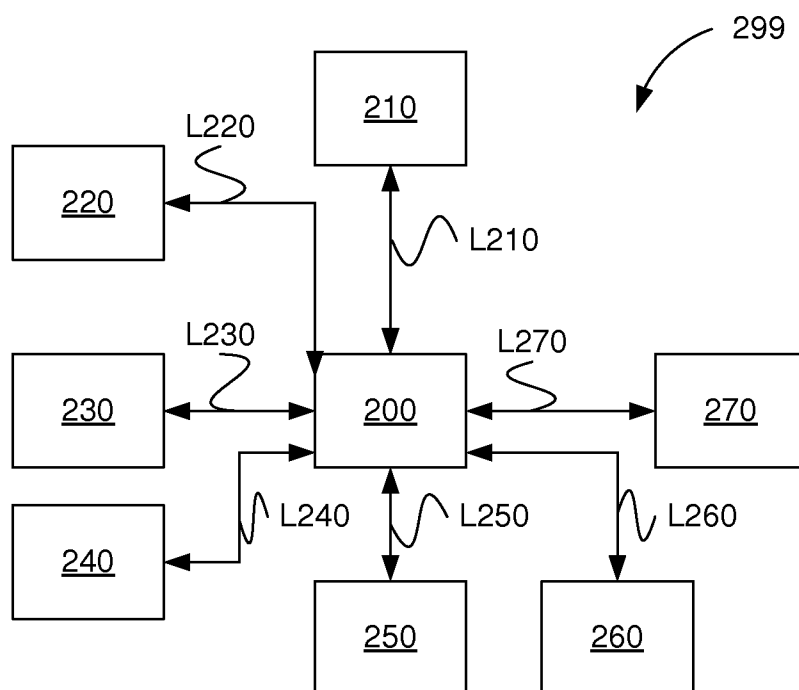


Fig. 2

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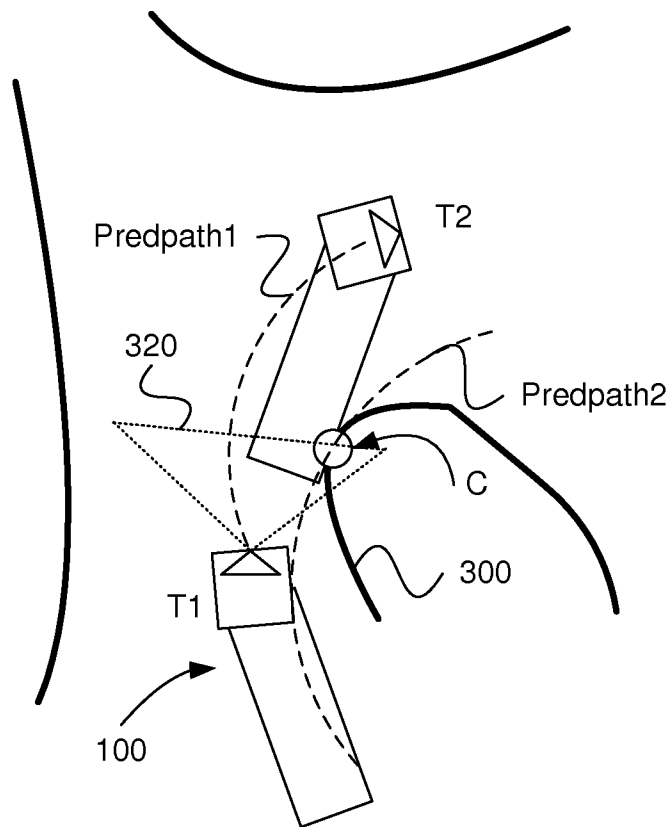


Fig. 3a

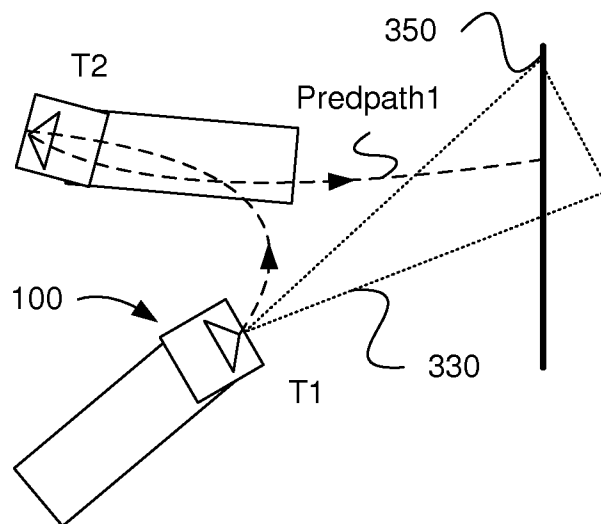


Fig. 3b

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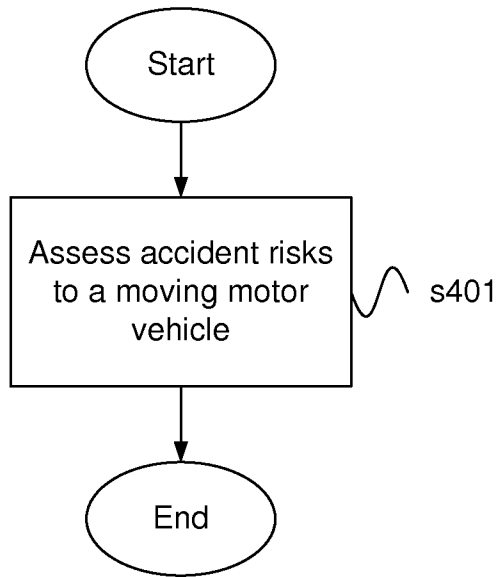


Fig. 4a

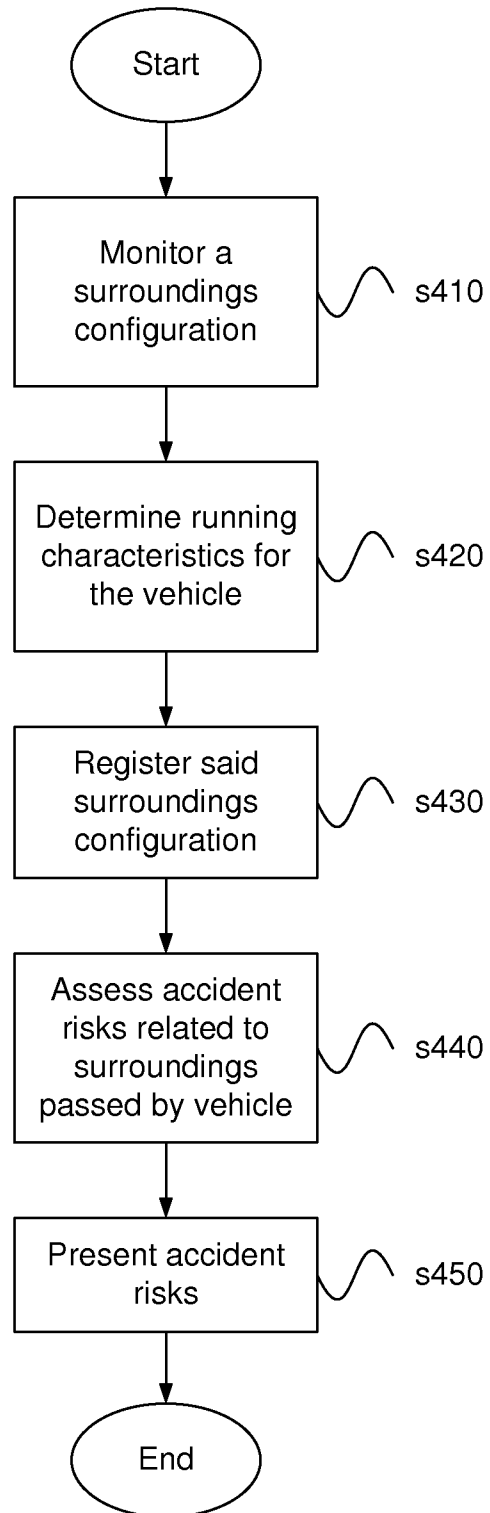


Fig. 4b

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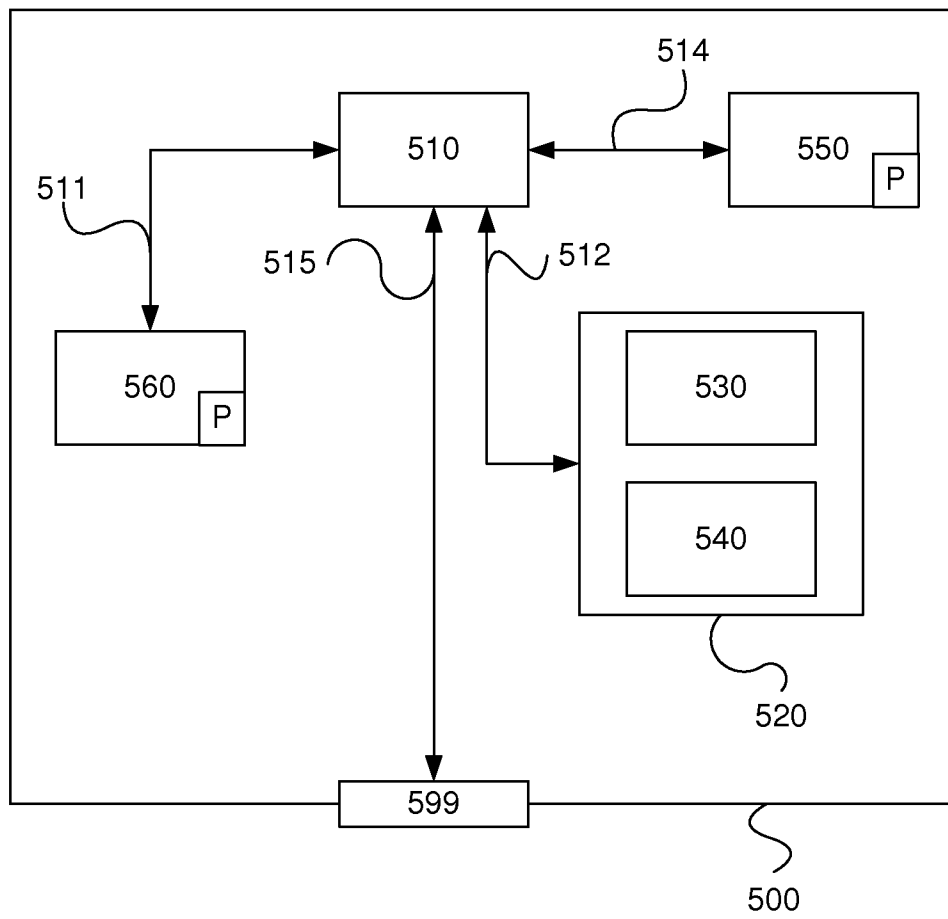


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2013/050772

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B60W, G08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 10103767 A1 (DAIMLER CHRYSLER AG), 5 September 2002 (2002-09-05); abstract --	1-14
A	EP 0729861 A2 (EATON VORAD TECHNOLOGIES LLC), 4 September 1996 (1996-09-04); abstract; figures 1-3 --	1-14
A	DE 102010007884 A1 (DAIMLER AG), 2 December 2010 (2010-12-02); abstract --	1-14
A	DE 102009035072 A1 (BAYERISCHE MOTOREN WERKE AG ET AL), 10 February 2011 (2011-02-10); abstract; figures 1-2 -- -----	1-14

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

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“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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

“&” document member of the same patent family

Date of the actual completion of the international search

18-10-2013

Date of mailing of the international search report

21-10-2013

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Continuation of: second sheet**International Patent Classification (IPC)*****B60W 30/08*** (2012.01)***G08G 1/16*** (2006.01)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/SE2013/050772

DE	10103767 A1	05/09/2002	NONE
EP	0729861 A2	04/09/1996	NONE
DE	102010007884 A1	02/12/2010	NONE
DE	102009035072 A1	10/02/2011	NONE