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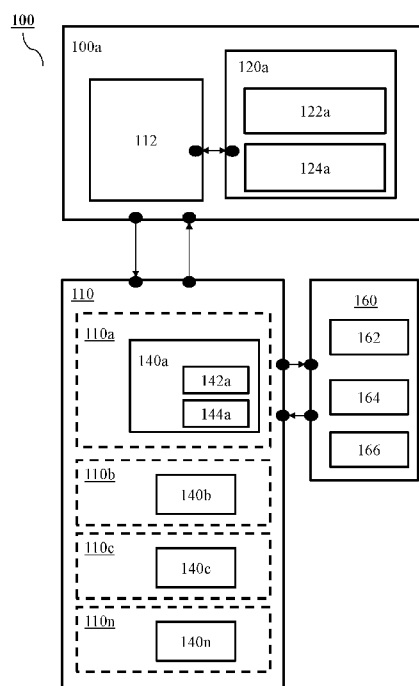


Fig. 1

(57) Abstract: A vehicle safety system and a method of controlling a vehicle safety system is provided herein. The method of controlling a vehicle safety system includes determining, by an electronic control unit of the vehicle safety system, a cause of a pressure fluctuation in at least one tyre of a vehicle, based upon one or more pressure value of the at least one tyre; and executing, by the electronic control unit of the vehicle safety system, at least one precautionary function of the vehicle while maintaining an operation of the vehicle.

A Vehicle Safety System and A Method of Controlling the Same

Description

5

TECHNICAL FIELD

The present disclosure relates to an electronic control system,
and more particularly, a vehicle safety electronic control
10 system.

BACKGROUND

15 Often, the lifespan of a tyre may be shortened due to
flattening of tyres. One of the most common cause is puncturing
of the tyre by sharp objects, which may cause the tyres to
deflate slowly or rapidly, depending on severity of the
puncture. Under scenario where puncturing of tyre is minor,
20 the vehicle may still operate and continue driving until the
tyre flatten completely, maximising the lifespan of tyres. A
driver may choose to replace a flatten tyre with a spare tire
in the motor vehicle or send the vehicle for tyre repair or
replacement at workshops.

25

Nonetheless, in severe circumstances, tyre punctures may have
an immediate effect on the operation of the vehicle, leading
to vehicle breakdowns, loss of control of vehicle and/or even
traffic collision, causing danger to both driver and other
30 road users.

SUMMARY

A purpose of this disclosure is to provide a solution to the
5 problem of losing control of a vehicle in operation due to
puncturing of tyre.

A further purpose of the present disclosure is to provide a
vehicle safety system which tracks the usage of a vehicle in
10 the event of tyre puncture, to ensure the driver is able to
safely continue operating the vehicle despite minor puncture
in tyres.

In the first aspect of this disclosure, a method for
15 controlling a vehicle safety system is provided. The method
may include determining, by an electronic control unit of the
vehicle safety system, a cause of a pressure fluctuation in at
least one tyre of a vehicle, based upon one or more pressure
value of the at least one tyre; and executing, by the
20 electronic control unit of the vehicle safety system, at least
one precautionary function of the vehicle while maintaining an
operation of the vehicle.

The cause of the pressure fluctuation may be a resistive force
25 against a deflation of the at least one tyre.

The resistive force may be caused by a reinforcement layer of
the at least one tyre resisting against the deflation, or an
adhesive injected into the at least one tyre resisting against
30 the deflation.

The at least one precautionary function of the vehicle may
comprise imposing a vehicle speed limit, activating a warning

notification, activating an autonomous driving function or a combination thereof.

5 The method may further comprise the electronic control unit of the vehicle safety system transmitting a first signal to a transmission control system of the vehicle in response to the pressure fluctuation. The transmission control system may be configured to impose a vehicle speed limit in response to receiving the first signal.

10

The method may further comprise the electronic control unit of the vehicle safety system transmitting a second signal to a warning system upon the vehicle operating for a predetermined mileage.

15

The warning system may be configured to activate a notification in response to receiving the second signal.

20 The method further comprises the electronic control unit of the vehicle safety system transmitting a third signal to an autonomous driving system of the vehicle in response to operation of the vehicle.

25 The method further comprises deactivating an autonomous driving function in response to receiving an authorisation.

30 In a second aspect of this disclosure, a vehicle safety system is provided herein. The vehicle safety system may include an electronic control unit configured to execute a set of programmable instructions operable to: determine a cause of a pressure fluctuation in at least one tyre of the vehicle based upon one or more pressure value of the at least one tyre; and execute at least one precautionary function of the vehicle and at the same time maintain an operation of the vehicle.

The set of programmable instructions may be operable to transmit one or more signals to at least one vehicle system upon determination of the cause of the pressure fluctuation.

5

The at least one vehicle system may comprise a transmission control system, a warning system, an autonomous driving system or a combination thereof.

10 The at least one precautionary function may be executed upon determination of a resistive force causing the pressure fluctuation, the at least one precautionary function comprising imposing a vehicle speed limit, activating a notification, activating an autonomous driving function or a
15 combination thereof.

The autonomous driving system may be further configured to deactivate an autonomous driving function upon receipt of an authorisation.

20

In a third aspect of this disclosure provided herein may be a non-transitory computer-readable storage medium for storing a set of programmable instructions, where executed by one or more electronic control unit of a vehicle, cause the one or
25 more electronic control unit to perform operations according to the method as described above.

Advantageously, this disclosure solves the problem of losing control of a vehicle in operation due to puncturing of tyre,
30 by determining a cause of a pressure fluctuation in at least one tyre of a vehicle and executing at least one precautionary function while maintaining operation of the vehicle.

Another advantage of the present disclosure is to provide a vehicle safety system which tracks a status of a vehicle after a tyre puncture, and execute a suitable precautionary function corresponding to the state of the vehicle, thereby allowing
5 the vehicle to maintain operation while ensuring control of the vehicle, to ensure safety of driver and other road users.

Further, the present disclosure may provide an optimisation of a lifespan of punctured tyre by maintaining operation of the
10 vehicle by activating the precautionary functions.

BRIEF DESCRIPTION OF DRAWINGS

15 Other objects and aspects will become apparent from the following description of embodiments with reference to the accompany drawings in which:

Fig. 1 illustrates a block diagram of a vehicle safety system
20 100 according to an exemplary embodiment as disclosed herein.

Fig. 2 illustrates a flowchart 200 according to an exemplary embodiment as disclosed herein.

25 Fig. 3a to Fig. 3c illustrates a flowcharts 300a, 300b and 300c according to exemplary embodiments as disclosed herein.

DETAILED DESCRIPTION OF EMBODIMENTS

30

Hereinafter, an explanation of a vehicle safety system and a method of controlling a vehicle safety system will be discussed in detail.

The term "first", "second" and the like shall denote modification of various different elements of various different embodiments of the present disclosure but shall not limit the elements thereto. The terms may be used to distinguish one element from another element. For instance, "a first signal" and "a second signal" denote reference to different signals regardless of order of importance and the elements may be executed independently or performed independently to each other without departing from the scope and spirit of this disclosure.

The expression "configured to" used in various implementations of this disclosure may be interchangeably used with "suitable for", "having the capacity to", "designed to", "adapted to", "made to", or "capable of" according to a situation, for example. The term "configured to" may not necessarily mean "specifically designed to" in terms of hardware. Instead, the expression "a device configured to" in some situations may mean that the device and another device or part are "capable of" carrying out a function. For example, "a processor configured to perform A, B, and C" in a phrase may mean a dedicated processor (e.g., an embedded processor) for performing a corresponding operation or a generic-purpose processor (e.g., a central processing unit (CPU) or application processor (AP)) for performing corresponding operations by executing at least one software program stored in a memory device.

The term "processor" shall denote broadly, to encompass a general purpose processor, a central processing unit (CPU), a microprocessor, a digital signal processor (DSP), a controller, a microcontroller, a state machine, and so forth. The term "processor" may denote a combination of processing devices, e.g., a combination of a DSP and a microprocessor, a

plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

The term "memory" shall denote broadly, to encompass any
5 electronic component capable of storing electronic
information. The term "memory" may denote several types of
processor-readable media such as random access memory (RAM),
read-only memory (ROM), non-volatile random access memory
(NVRAM), programmable read-only memory (PROM), erasable
10 programmable read only memory (EPROM), electrically erasable
PROM (EEPROM), flash memory, magnetic or optical data storage,
registers, etc. Memory is in electronic communication with a
processor if the processor can read information from and/or
write information to the memory. Memory that is integral to a
15 processor is in electronic communication with the processor.

Turning now to the drawings, Fig. 1 illustrates a system block
diagram 100 in accordance to an exemplary embodiment. The
system block diagram 100 includes a tyre pressure monitoring
20 system 100a having one or more pressure sensor 112, and an
electronic control unit 120a. The electronic control unit 120a
of the tyre pressure monitoring system 100a contains a
processor 122a and a memory 124a. The tyre pressure monitoring
system 100a is electrically connected to one or more vehicle
25 systems 110. In an embodiment, the tyre pressure monitoring
system 100a is electrically connected to a safety system 110a,
an autonomous driving system 110b and a transmission control
system 110c as shown in Fig. 1. The number of vehicle systems
may be scalable (i.e. 110n) depending on design specification.
30 Each of the vehicle system 110 contains an electronic control
unit 140a, 140b and 140c respectively, having at least one
processor (e.g. 142a) and a memory (e.g. 144a).

In another embodiment, the tyre pressure monitoring system 100a may alternatively or additionally comprises an electronic tyre information system (eTIS). The electronic tyre information system may display tyre specification of a type of tyre(s) installed on the vehicle, and display the tyre information on a display unit (not shown). Identification of type of tyre used is based upon tyre codes which is hard-coded on the tyres. Accordingly, the tyre specification of each type of tyre is as defined by the tyre manufacturer.

10

The vehicle system 110 is further, electrically connected to warning system 160, which may be an instrument cluster 162, a display unit 164 or an audio system 166. However, it will be understood that such electrical connection is exemplary and that warning system 160, tyre pressure monitoring system 100a and vehicle system 110 may be interconnected to one another in any appropriate way.

With reference to Fig. 2, flowchart 200 illustrates a process for determining a cause of pressure fluctuation in at least one tyre of a vehicle in accordance to an exemplary embodiment. In step 202, the electronic control unit 140a of the safety system 110a receives one or more measurement of tyre pressure values of at least one tyre of a vehicle from tyre pressure monitoring system 100a. The electronic control unit 140a of the safety system 110a determines a cause of the tyre pressure fluctuation in the at least one tyre of the vehicle. While Fig. 2 illustrates that safety system 100a has its own electronic control unit (140a), it will be understood that the functions of receiving tyre pressure values and/or determining the cause of tyre pressure fluctuation may be integrated into other electronic control unit(s) in the vehicle.

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Determination of the cause of pressure fluctuation in the next step 204 may be based upon certain types of conditions. By way of an example, the at least one tyre of the vehicle has a puncture, and the pressure fluctuation in the at least one
5 tyre is due to a resistive force against a deflation of the tyre caused by the puncture. In one embodiment, a reinforcement layer is the source of the resistive force against the deflation of the tyre caused by the puncture. The reinforcement layer may be a structural layer within a tyre. An example of
10 a tyre having a reinforcement layer may be a run flat tyre, which has a structural layer around an inner wall of the tyre. The structural layer around the inner wall of the tyre achieves self-supporting function by slowing the process of deflation in the event the run flat tyre is punctured. Where the
15 electronic tyre information system (eTIS) is included in the system 100a, in determining the vehicle speed limit to impose as part of the precautionary function, the electronic control unit 140a of the safety system 110a may obtain the tyre specification based on the tyre code. The electronic control
20 unit 140a may be configured to identify for any speed limit specified after puncture of the tyre in the specification. The electronic control unit 140a may then send a first signal to a transmission control system 110c to execute the speed limit.

25 In an alternative embodiment, the reinforcement layer may be an additional layer of material to cover or close up a puncture. The reinforcement layer may be an adhesive or a rubber sheet that is adhered to an external wall of the puncture. The reinforcement layer may be an adhesive injected
30 into the puncture. An example of a suitable adhesive is a bonding agent, such as a tyre repair sealant. When injected into the tyre, the adhesive forms an adhesive layer to conceal a puncture in the tyre. By concealing the puncture with an adhesive layer, the deflation of tyre due to air being released

from the punctured tyre is delayed, thereby creating a resistive force against a deflation of the tyre.

Upon determining the cause of pressure fluctuation in the at least one tyre of the vehicle by the electronic control unit 140a of the safety system 110a, in the next step 206, the electronic control unit 140a of the safety system 110a executes at least one precautionary function of the vehicle, while maintaining an operation of the vehicle.

10

A significant contribution of the solution disclosed herein is the detection of a punctured tyre and execution of at least one precautionary function of the vehicle in response to detection of the punctured tyre, while maintaining the operation of the vehicle. Accordingly, the solution disclosed herein achieves the purpose of avoiding loss of control of a vehicle due to a punctured tyre.

A known method of addressing a punctured tyre may include replacement of a punctured tyre with a spare tyre onboard a vehicle. However, sale of a motor vehicle with a temporary spare tyre usually involves additional cost of a vehicle, from an original equipment manufacturer (OEM) perspective. Alternative solutions to providing a temporary spare tyre may include run flat tyres and a sealant repair kit.

The solution provided herein uses the information received by a tyre pressure monitoring system, and/or with an electronic tyre information system in relation to pressure of tyres, to determine the cause of a pressure fluctuation in the tyres. As explained above, repairing a punctured tyre may be carried out in accordance to any repair method, of which exemplary methods are namely by use of a run flat tyre whereby the reinforcement layer slows down the process of deflation; a puncture repaired

by a workshop using an externally applied additional rubber sheet; or injecting an adhesive into the punctured tyre to conceal the puncture, all of which results in the creation of a resistive force against air exiting the punctured area, slowing down the process of air being released from the punctured tyre, causing deflation. In the event of a puncture, it will be understood that air will slowly exit from the punctured area even after a repair. The speed at which air exits the punctured area may be higher than in scenarios where there is no puncture. The speed of air loss being of a certain value may be used as a determination of the cause of pressure fluctuation to trigger the execution of the at least one precautionary function. If the speed of air loss is between 0.01 to 1 bar per minute, the cause of fluctuation due to the resistive force against the deflation of the at least one tyre is cause by the adhesive injected into the at least one tyre resisting against the deflation. In an exemplary example, the adhesive injected is a sealant from a sealant repair kit for repairing tyres. The cause of fluctuation due to the resistive force against the deflation of the at least one tyre caused by the reinforcement layer resisting against the deflation is also between 0.01 bar to 1 bar per minute. In an example, tyre pressure monitoring system 100a may periodically send tyre pressure readings to safety system 110a. Safety system 110a may be configured to calculate the rate of increase or decrease between consecutive pressure readings. If the speed of air loss is of a certain range, e.g. between 0.01 to 1 bar per minute, safety system 110a may then obtain the tyre code to determine the type of tyre that is experiencing the loss in air pressure. If such loss in air pressure is typical for the tyre type, safety system 110a does not proceed to execute the precautionary function. On the other hand, an atypical loss of air pressure may indicate to safety system 110a to proceed with executing the precautionary function. Alternatively,

safety system 110a may be configured to proceed with executing the precautionary function on the basis of the speed of air loss meeting a certain threshold.

5 In yet another alternative, the speed of air filling may be used to trigger the execution of the precautionary function. Such embodiment may be useful during self-repair of a tyre with a sealant repair kit. After adhesive is injected into the puncture, the tyre may be inflated by a pump. The speed of air
10 filling may be detected by tyre pressure monitoring system 100a or safety system 110a. Similar to the embodiment above, if the speed of air filling is of a certain range, e.g. lower than 1 bar per minute, safety system 110a may then proceed with executing the precautionary function

15

By determining the cause of the pressure fluctuation, the electronic control unit 140a is able to determine if the tyre has been repaired by a sealant, or whether the tyre in use is a run flat tyre with self-supporting functions, based upon one
20 or more pressure value measured. Once the cause of the pressure fluctuation has been determined, the electronic control unit 140a sends one or more signals to other vehicle systems on board, to activate at least one precautionary function based upon a series of predetermined threshold, as set forth in this
25 disclosure below. A further purpose of providing a vehicle safety system to ensure the driver is able to safely continue operating the vehicle despite puncture in tyres is thereby achieved.

30 Fig. 3a to 3c illustrates multiple processes for executing at least one precautionary function in accordance to exemplary embodiments of this disclosure.

An exemplary embodiment is illustrated in Fig. 3a showing flowchart 300a. In step 206a, in response to the determination of cause of pressure fluctuation at step 204 of flowchart 200, the electronic control unit 140a of the safety system 110a
5 sends a first signal to a transmission control system 110c.

In step 302, the electronic control unit 140c of the transmission control system 110c execute an instruction to impose a vehicle speed limit on the vehicle upon receiving the
10 first signal. By using a run flat tyre or a sealant kit, in the event of a tyre puncture, the at least one precautionary function of imposing a vehicle speed limit as disclosed in step 302 enables the vehicle to maintain in operation in a 'limp home' mode until the functionality of the run flat tyre
15 is exhausted, i.e. deflated. The vehicle speed limit imposed may be in accordance to a value obtained from a tyre specification as provided by the run flat tyre manufacturer, or the value may be obtained from an instruction manual of a sealant kit.

20

An exemplary embodiment is as illustrated in Fig. 3b, showing flowchart 300b. In step 206b, in response to the determination of cause of pressure fluctuation at step 204 of flowchart 200, the electronic control unit 140a of the safety system 110a
25 sends a second signal to a warning system 160, upon the vehicle operating for a predetermined mileage. The predetermined mileage may be a threshold mileage allowable in accordance to the instruction manual as provided by the sealant kit or tyre specification of the run flat tyre. It shall be understood the
30 predetermined mileage may be correlated with a time the vehicle has been in operation at the vehicle speed limit imposed, based upon theory of physics, for design purposes. The predetermined mileage may be an indication of a distance the vehicle has been travelling or operating with at least one at least

partially deflated tyre, at a vehicle speed limit imposed by the electronic control unit 140a of the safety system 110a. In contrast, while existing tyre pressure monitoring system and/or electronic tyre information system may provide warnings
5 to a driver in the event that the tyre pressure is not undesirable, such standalone functions only serves the purposes of informing the driver of potential defects in tyres, but does not work with other electronic control units or vehicle systems to achieve the purpose of this disclosure,
10 i.e. enabling the vehicle to continue operation despite a puncture in at least one of the tyres.

In an exemplary embodiment, the warning system 160 executes the at least one precautionary function in the form of a visual
15 notification of an instrument cluster 162 or a display unit 164 in the step 304, upon receiving the second signal from the electronic control unit 140a of the safety system 110a when the vehicle reaching the predetermined mileage. In an alternative embodiment, the warning system 160 executes the at
20 least one precautionary function in the form of an audio notification through an audio system 166 in response to receiving a second signal from the electronic control unit 140a of the safety system 110a. The visual or audio notification serves as a warning to indicate the vehicle has
25 been operating with at least one tyre that is at least partially deflated for a period of time, and the operation of the vehicle reached a predetermined mileage.

An exemplary embodiment is as illustrated in Fig. 3c, showing
30 flowchart 300c. In step 206c, in response to the determination of cause of pressure fluctuation at step 204 of flowchart 200, the electronic control unit 140a of the safety system 110a sends a third signal to an autonomous driving system 110b. In step 306, the at least one precautionary function may be in

the form of activating the autonomous driving function executable by an autonomous driving system 110b. The at least one precautionary function of activating the autonomous driving function may be useful in the event that the vehicle
5 has been in operation and has reached or is reaching the predetermined mileage limit. Upon user's consent, the vehicle may continue operating in autonomous driving mode, and the vehicle may be driven to a nearest workshop for tyre replacement.

10

In another exemplary embodiment, the electronic control unit 140a of the vehicle safety system 110a may execute an instruction to deactivate the autonomous driving function upon an authorisation by the transmission control system 110c to
15 apply a braking application to the vehicle in step 308. The at least one precautionary function of deactivating the autonomous driving function may be useful in the event that a potential vehicle collision is detected. Detection of vehicle collision may be supported by a navigation system.

20

In yet another embodiment, the authorisation to deactivate the autonomous driving function by the autonomous driving system 110b is executed by an automatic braking system (not shown in figures), configured to activate advanced emergency braking
25 system (AEBS) or autonomous emergency braking (AEB) functions, for activating autonomous emergency braking function.

The above exemplary embodiments of steps 302, 304 and 306 are independent of each other and the electronic control unit 140a
30 of vehicle safety system 110a is operable to execute the at least one precautionary function independently of each other in no particular order of importance or sequence without limitation thereto.

The detailed description above serves the purpose of explaining the principles of the present disclosure and its practical application, thereby enabling others skilled in the art to understand the disclosure for various exemplary embodiments and with various modifications as are suited to the particular use contemplated. The detailed description is not intended to be exhaustive or to limit the present disclosure to the precise embodiments herein. Modifications and equivalents will be apparent to practitioners skilled in this art and are encompassed within the scope and spirit of the appended claims.

List of Reference Signs

- 100 - System Block Diagram
- 15 100a - Tyre pressure monitoring system
- 112 - Tyre pressure sensor
- 120a - Electronic Control Unit of 100a
 - 122a - Processor
 - 124a - Memory
- 20 110 - one or more vehicle system 110
 - 110a - Safety System
 - 140a - Electronic Control Unit (ECU) of Safety System
 - 142a - Processor
 - 144a - Memory
- 25 110b - Autonomous Driving System
 - 140b - Electronic Control Unit of Autonomous Driving System
- 110c - Transmission Control System
- 140c - Electronic Control Unit of Transmission Control System
- 160 - User Interface
- 30 162 - Instrument cluster
- 164 - Electronic Display
- 166 - Audio System
- 200 - Flowchart for determining a cause of pressure fluctuation

202 - Receiving one or more measurement of tyre pressure value

204 - Determination of cause of pressure fluctuation

206 - Electronic Control Unit of Vehicle System executes at least one precautionary function

5

300a - Flowchart for processing a precautionary function according to an exemplary embodiment

206a - ECU of Safety System sends signal to Transmission Control System

10 302 - Execution of precautionary function by Transmission Control System

300b - Flowchart for processing a precautionary function according to an exemplary embodiment

206b - ECU of Safety System sends signal to Warning System

15 304 - Execution of precautionary function by Warning System

300c - Flowchart for processing a precautionary function according to an exemplary embodiment

20 206c - ECU of Safety System sends signal to Autonomous Driving System

306 - Execution of precautionary function by Autonomous Driving System

308 - Receiving an authorisation and deactivating Autonomous Driving System

25

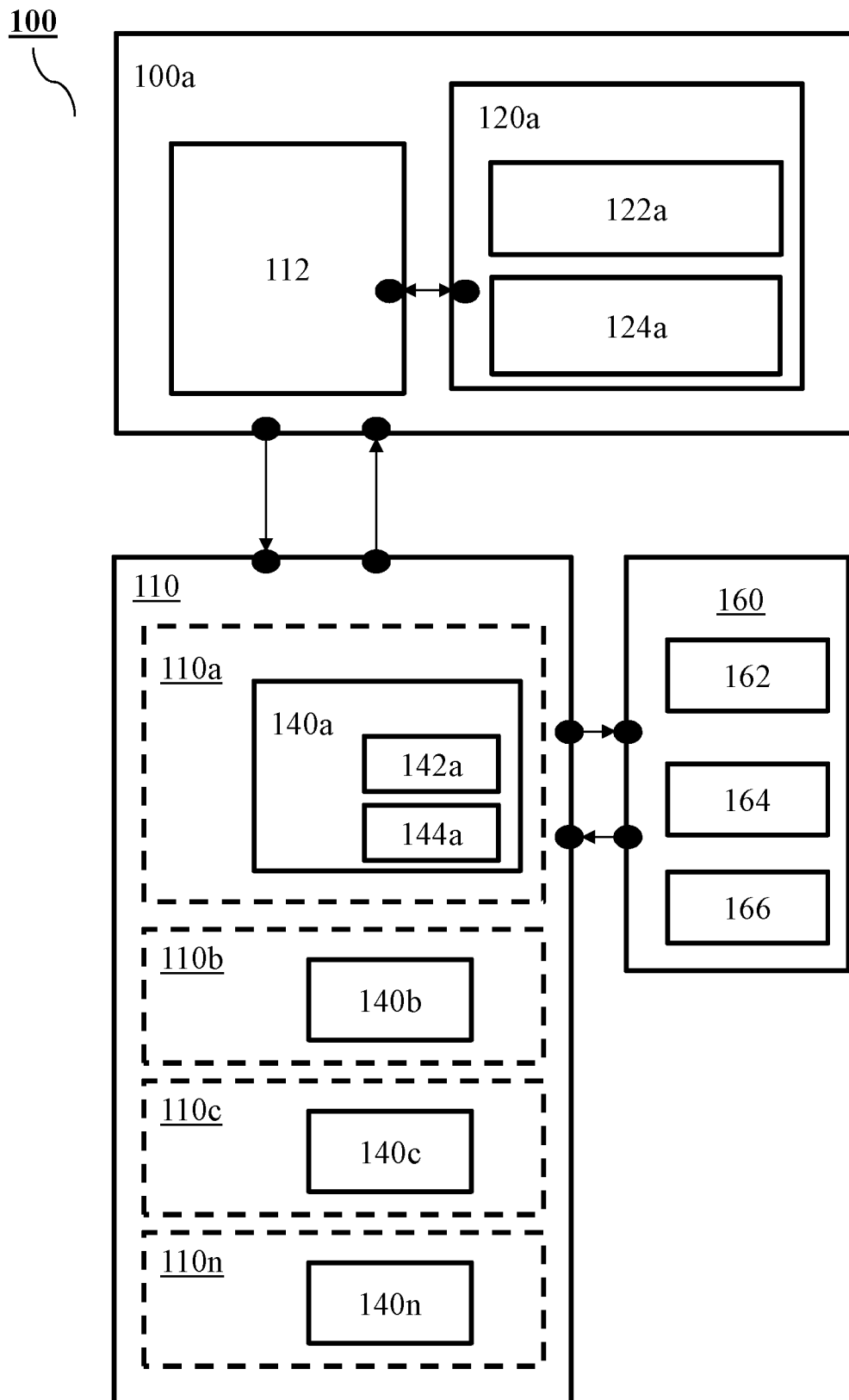
Patent claims

1. A method (200) for controlling a vehicle safety system,
comprising:
 - 5 Determining (204), by an electronic control unit of
the vehicle safety system, a cause of a pressure
fluctuation in at least one tyre of a vehicle, based upon
one or more pressure value of the at least one tyre; and
 - Executing (206), by the electronic control unit of
10 the vehicle safety system, at least one precautionary
function of the vehicle while maintaining an operation of
the vehicle.
2. The method (200) according to Claim 1, wherein the cause
15 of the pressure fluctuation is a resistive force against
a deflation of the at least one tyre.
3. The method (200) according to Claim 2, wherein the
resistive force is caused by a reinforcement layer of the
20 at least one tyre resisting against the deflation, or an
adhesive injected into the at least one tyre resisting
against the deflation.
4. The method (200) according to Claims 1 to 3, wherein the
25 at least one precautionary function of the vehicle
comprises imposing a vehicle speed limit, activating a
warning notification, activating an autonomous driving
function or a combination thereof.
- 30 5. The method (200) according to Claims 1 to 4, further
comprising the electronic control unit (140a) of the
vehicle safety system (110a) transmitting a first signal
to a transmission control system (110c) of the vehicle in
response to the pressure fluctuation, the transmission

control system (110c) configured to impose a vehicle speed limit in response to receiving the first signal.

- 5 6. The method (200) according to Claims 1 to 5, further comprising the electronic control unit (140a) of the vehicle safety system (110a) transmitting a second signal to a warning system (160) upon the vehicle operating for a predetermined mileage.
- 10 7. The method (200) according to Claim 6, wherein the warning system (160) is configured to activate a notification in response to receiving the second signal.
- 15 8. The method (200) according to Claims 1 to 7, further comprising the electronic control unit (140a) of the vehicle safety system (110a) transmitting a third signal to an autonomous driving system (110b) of the vehicle in response to operation of the vehicle.
- 20 9. The method (200) according to Claim 8, further comprising deactivating (308) an autonomous driving function in response to receiving an authorisation.
- 25 10. A vehicle safety system (110a) comprising:
 an electronic control unit (140a) configured to execute a set of programmable instructions operable to:
 determine a cause of a pressure fluctuation in at least one tyre of the vehicle based upon one or more pressure value of the at least one tyre; and
30 execute at least one precautionary function of the vehicle and at the same time maintain an operation of the vehicle.

11. The vehicle safety system (110a) according to Claim 10, wherein the set of programmable instructions is operable to transmit one or more signals to at least one vehicle system upon determination of the cause of the pressure fluctuation.
12. The vehicle safety system (110a) according to Claim 11, wherein the at least one vehicle system (110) comprises of a transmission control system (110c), a warning system (160), an autonomous driving system (110b) or a combination thereof.
13. The vehicle safety system (110a) according to Claims 10 to 12, wherein the at least one precautionary function is executed upon determination of a resistive force causing the pressure fluctuation, the at least one precautionary function comprising imposing a vehicle speed limit, activating a notification, activating an autonomous driving function or a combination thereof.
14. The vehicle safety system according to Claims 12 and 13, wherein the autonomous driving system (110b) is further configured to deactivate an autonomous driving function upon receipt of an authorisation.
15. A non-transitory computer-readable storage medium for storing a set of programmable instructions, where executed by one or more electronic control unit of a vehicle, cause the one or more electronic control unit to perform operations according to any one of Claims 1 to 9.

**Fig. 1**

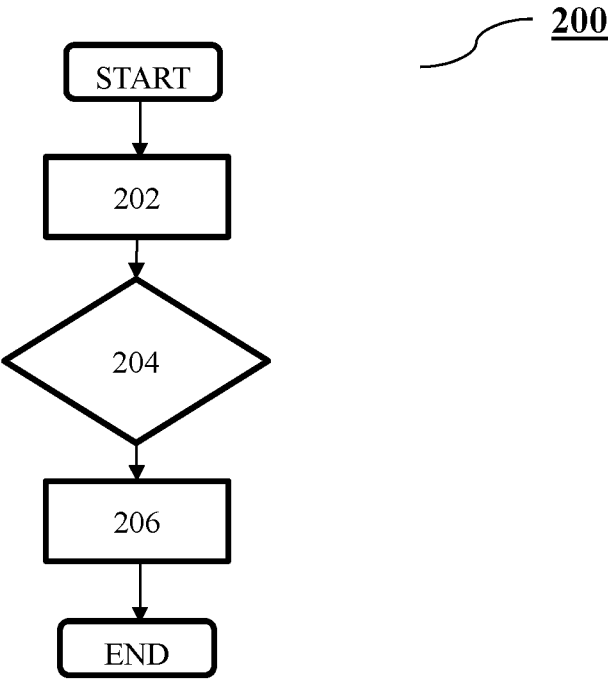
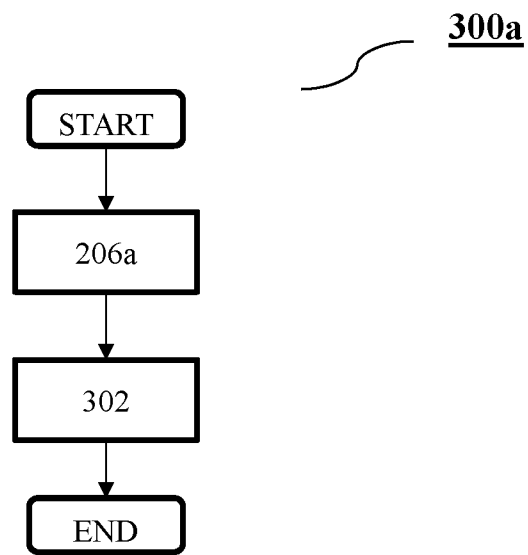
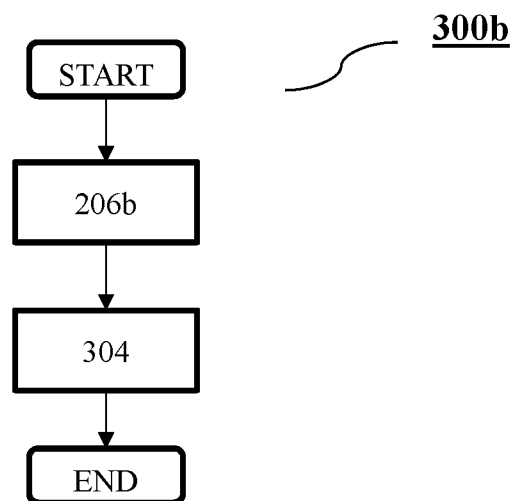
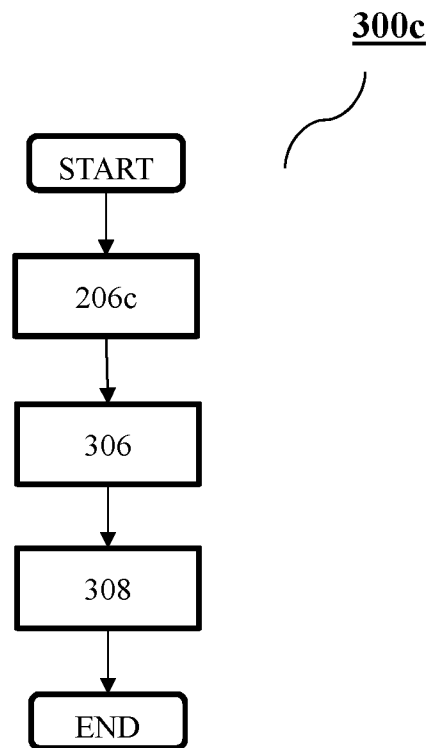


Fig. 2

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**Fig. 3a****Fig. 3b**

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**Fig. 3c**

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/064943

A. CLASSIFICATION OF SUBJECT MATTER
INV. B60C23/04
ADD.

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)
B60C B60W

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	WO 2017/194957 A1 (ALEXANDER DENNIS LTD [GB]) 16 November 2017 (2017-11-16) claims 1-4; figure 5	1,4,5
X	US 5 895 846 A (CHAMUSSY JEAN-FRANCOIS [FR] ET AL) 20 April 1999 (1999-04-20) column 4; figures 1,2	1,6,7
X	US 2018/099533 A1 (GLATZ MICHAEL [DE]) 12 April 2018 (2018-04-12) paragraph [0034]; figures 1,2	1
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Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

29 July 2020

Date of mailing of the international search report

10/08/2020

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INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2020/064943

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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International application No

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