

(12) UK Patent

(19) GB

(11) 2585927

(13) B

(45) Date of B Publication

23.08.2023

(54) Title of the Invention: Improvements relating to vehicle safety devices

(51) INT CL: **B60T 7/02** (2006.01) **B60T 7/04** (2006.01) **B60T 7/08** (2006.01) **B60T 17/20** (2006.01)
G05D 1/00 (2006.01)

(21) Application No: 1910599.8

(22) Date of Filing: 24.07.2019

(43) Date of A Publication: 27.01.2021

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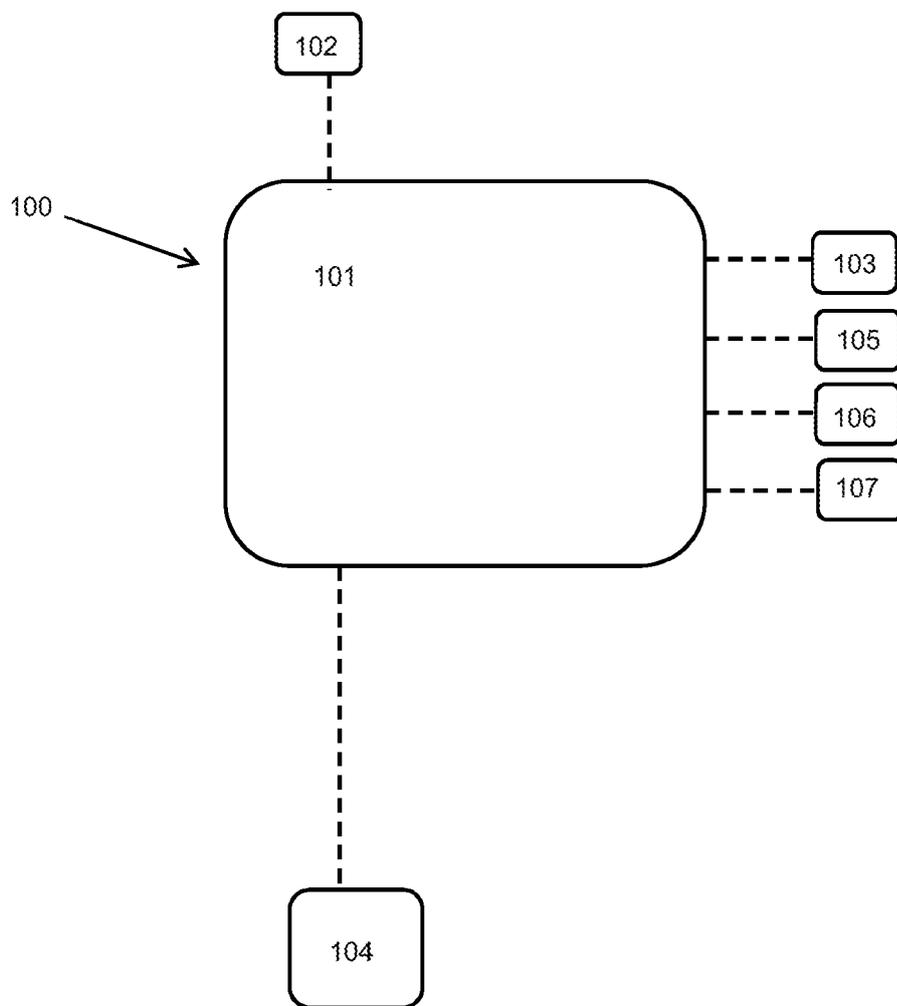
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(58) Field of Search:
As for published application 2585927 A viz:
INT CL **B60T, G05G**
Other: **WPI, EPODOC**
updated as appropriate

Additional Fields
Other: **None**

GB 2585927 B

Fig. 1



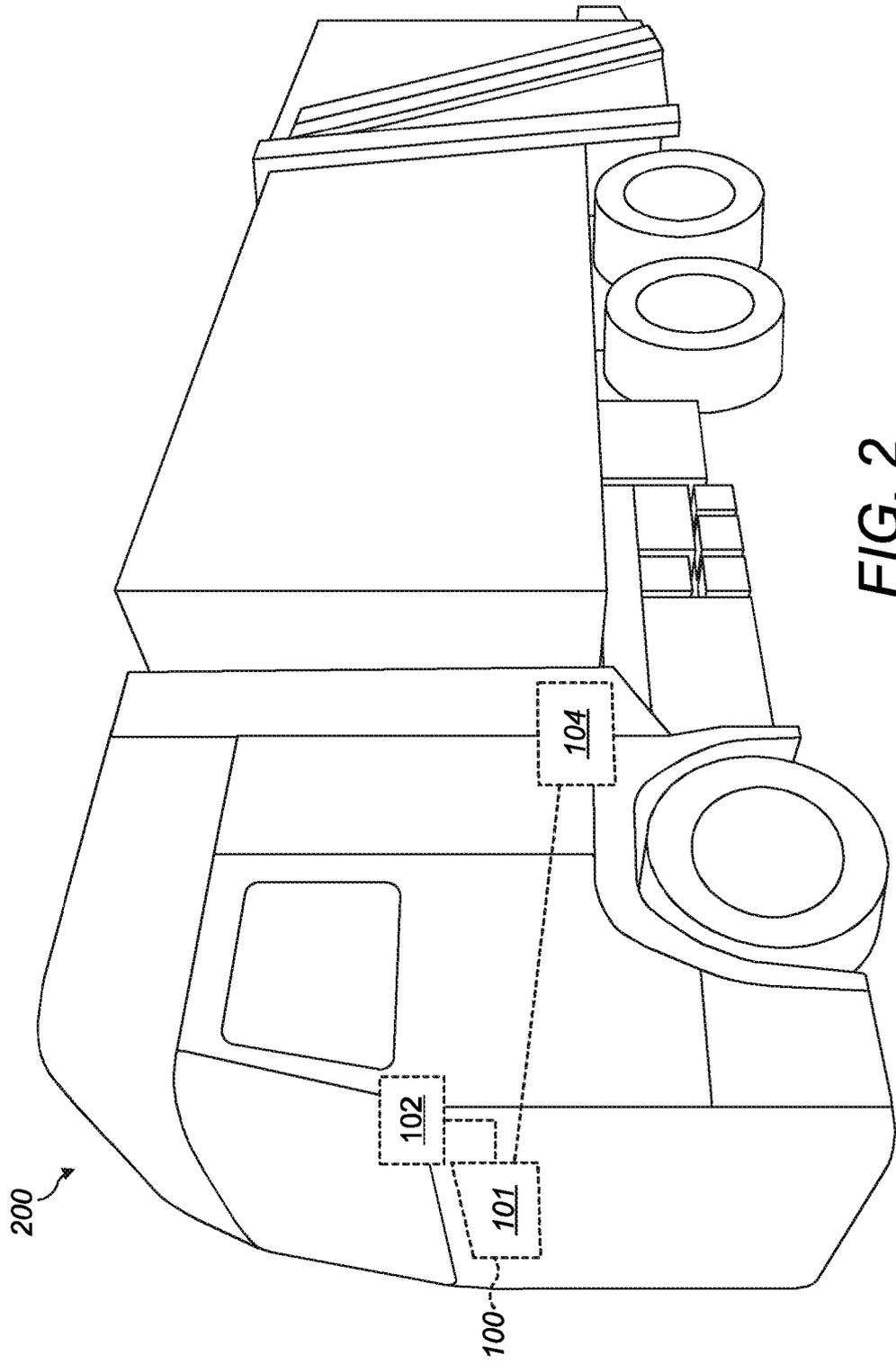


FIG. 2

Fig. 3

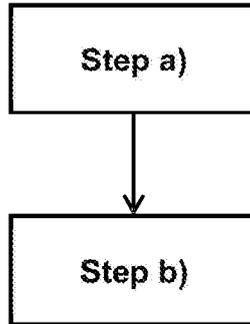
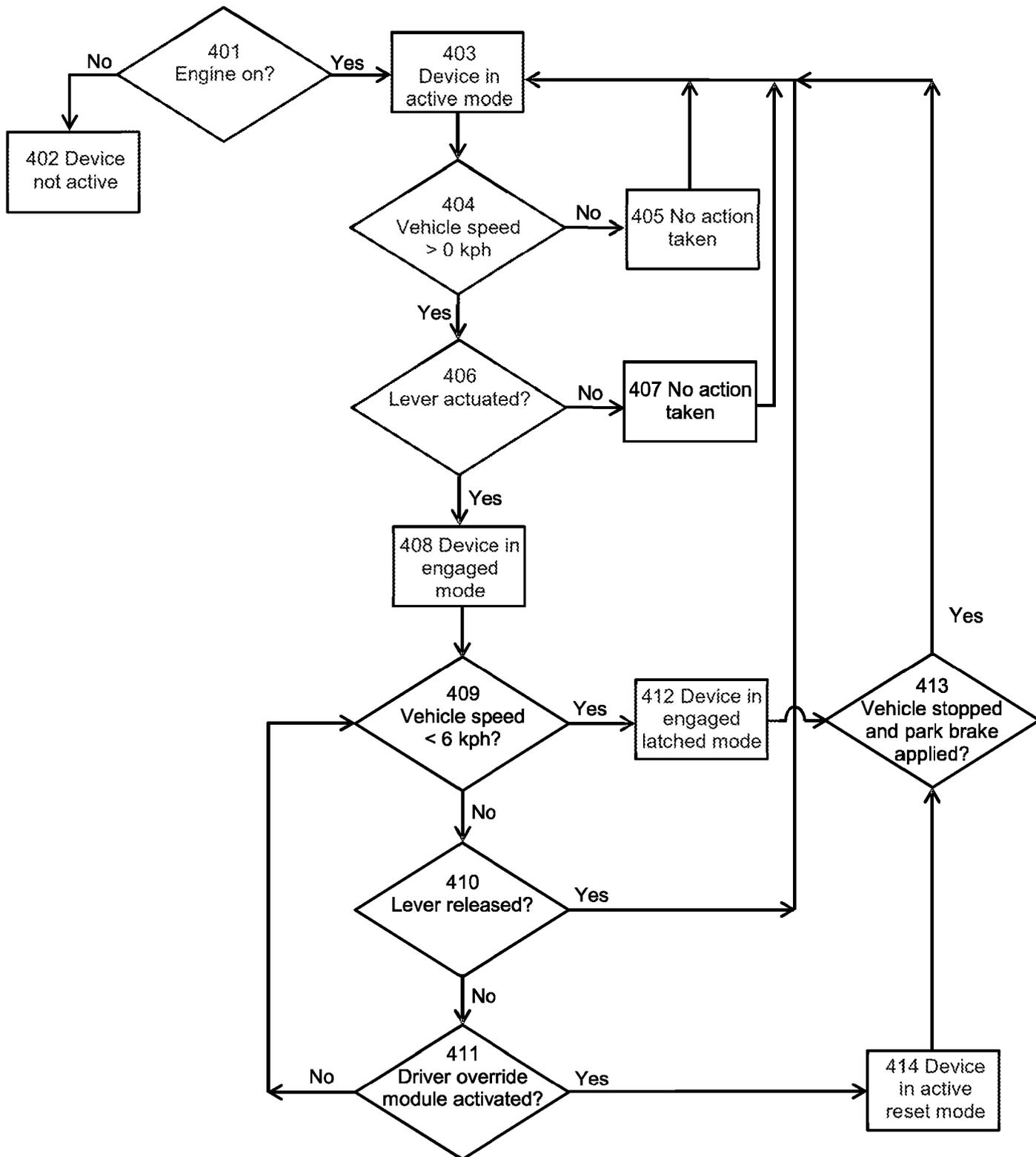


Fig. 4



Improvements Relating to Vehicle Safety Devices

Field

The present invention relates to a device or method for enabling a user other than a driver of a vehicle to slow and/or stop said vehicle. The present invention also relates to a vehicle comprising such a device, for example a large commercial vehicle. In particular the invention relates to a device or method for automatically applying a braking system of a vehicle, for example a large commercial vehicle, to prevent said vehicle moving uncontrollably, specifically when a driver of said vehicle is incapacitated.

Background

Known vehicles, for example motor vehicles, require skilled input from a driver to maintain the safe operation of such vehicles. Without the driver's skilled input such vehicles may move uncontrollably. Such uncontrolled movement has a high potential to cause accidents. Such accidents may cause serious damage to the vehicle, serious damage to property and most importantly may cause serious injury to the driver or other road users or bystanders. When the vehicle is a large commercial vehicle, the damage and injury that may be caused in the situation described above may be much more severe. For example, large commercial vehicles such as waste collection vehicles which operate in highly populated built-up areas can cause catastrophic damage to property and cause fatal injuries to bystanders, as happened in Glasgow in December 2014 where six pedestrians were killed by a waste collection vehicle after a driver suffered a sudden health problem which compromised his ability to control the vehicle.

Large commercial vehicles, for example lorries (also know as trucks), light goods vehicles, heavy goods vehicles, waste collection vehicles (also known as dustbin lorries or garbage trucks), buses and coaches, are fitted with air brake systems (also known as compressed air brake systems). Such air brake systems comprise a spring which biases a disc, drum or pad brake to an engaged position. Air pressure in the air brake system has to be maintained at a certain level to hold the brake in a disengaged position against the bias of the spring. When such a large commercial vehicle is parked, the air brake system has to be intentionally engaged by a user, for example a driver, to prevent the vehicle moving when parked on an inclined surface.

The safety of a vehicle in motion, for example a large commercial vehicle, depends on the driver's ability to control said vehicle. When a driver's ability to control a vehicle is reduced whilst driving the vehicle, for example if the driver experiences a sudden illness or injury, then the vehicle may move uncontrollably. This uncontrolled movement may cause one or more of several types of accident. Firstly, the vehicle may become damaged if it hits an obstacle or

runs off a road. Secondly, the vehicle may cause damage to property and/or serious injury to a person hit by the vehicle. Thirdly, another person may attempt to enter the moving vehicle in order to gain control of the vehicle and in doing so suffer serious injury, for example if the person falls under the wheels of the vehicle during the attempt to enter the vehicle.

- 5 These accidents may be more serious when the vehicle is a relatively large and relatively heavy vehicle, for example a large commercial vehicle of the types described above. Such vehicles when moving uncontrollably are liable to cause very serious damage to the vehicle itself and to property hit by the vehicle and/or cause very serious or fatal injury to persons hit by the vehicle or to a person attempting to enter the vehicle. The risk of such accidents
10 occurring should be minimised.

Some large commercial vehicles, particularly waste collection vehicles, are operated by a crew (or team) of people comprising at least one person other than the driver. In circumstances when the driver's ability to control the vehicle is reduced whilst the vehicle is moving, it can be difficult for another member of the crew operating the vehicle to take control of the vehicle
15 and/or bring the vehicle to a controlled stop in order to prevent the accidents discussed above, at least in part because all the controls of such vehicles are usually arranged to be readily accessible to the driver only.

The Applicant's previous patent application WO 2017/129963 A1 sought to provide a device, vehicle or method that addresses at least one disadvantage discussed above, for instance by
20 providing a device, vehicle or method which reduces the risk of accidents caused by vehicles moving uncontrollably, by enabling a user other than a driver of said vehicle to slow and/or stop a vehicle, for example when a driver's ability to control the vehicle is reduced whilst the vehicle is moving.

Summary Of The Invention

25 The inventors now provide a vehicle safety device which may bring improvements and advantages over the previously disclosed vehicle safety device and other known devices. The inventors have identified some disadvantages in the operation of the previously disclosed device, in particular in relation to potential accidental activation of the vehicle safety device and how the device is reset. Therefore it may be an aim of the present invention to provide an
30 improved vehicle safety device which enables a user other than a driver of said vehicle to slow and/or stop a vehicle, for example when a driver's ability to control the vehicle is reduced whilst the vehicle is moving. In particular, it may be an aim of the present invention to provide such a vehicle safety device which can be deactivated or overridden in appropriate circumstances when the driver is in full control of the vehicle and when the vehicle safety
35 device may have been activated accidentally.

According to aspects of the present invention, there is provided a device, vehicle or method as set forth in the appended claims. Other features of the invention will be apparent from the dependent claims, and the description which follows.

5 According to a first aspect of the present invention, there is provided a device for enabling a user other than a driver of a vehicle to slow and/or stop said vehicle, the device comprising an activation module and a control module;

wherein the activation module is adapted to:

receive an activating input from said user;

10 send an activating signal to the control module when said user provides said activating input; and

cease sending said activating signal to the control module when said user stops providing said activating input;

wherein the control module is adapted to:

15 receive said activating signal from the activation module when said user provides said activating input;

send an engagement signal to a braking system in said vehicle when the control module receives said activating signal from the activation module, to engage said braking system to slow and/or stop said vehicle; and

20 cease sending said engagement signal when the control module stops receiving said activating signal from the activation module, to disengage said braking system and cease to slow and/or stop said vehicle.

25 Suitably the device of this first aspect slows and/or stops the vehicle to which the device is attached when the activation module is activated by a user other than the driver of said vehicle. The device is intended to be activated by a user other than the driver, it may not be possible for the driver of said vehicle to activate the device whilst the driver is seated in the driver's seat of said vehicle.

Preferably the device enables a user other than a driver of said vehicle to slow said vehicle to a stop, preferably safely to a stop, suitably to a stop in a controlled manner.

30 Said user other than a driver of said vehicle may be a passenger who may typically sit inside said vehicle on a seat adjacent to said driver; or may be a member of a crew, which includes said driver, who are operating said vehicle, for example a large commercial vehicle such as a

waste collection vehicle. Such crew members may typically ride inside said vehicle on seats adjacent to a driver's seat, for example a seat beside a driver's seat or on seats behind a driver's seat.

5 The activation module is adapted to receive an activating input from said user. Suitably the activation module is adapted to receive a manual activating input from said user. The activation module may comprise a button, switch, lever, pull cord or touch pad which can receive an activating input from said user, for example a manual input from said user to activate the button, switch, lever, pull cord or touch pad. In some embodiments the activation module may be voice activated and therefore be adapted to receive a vocal activating input
10 from said user.

Preferably the activation module comprises a lever for receiving said manual activating input from said user. Suitably the lever is adapted to require a user to push or pull the lever in order to cause the activation module to send said activating signal to the control module.

15 The activation module is adapted to send an activating signal to the control module when said user provides said activating input. The activating signal may be in the form of an electrical signal sent from the activation module to the control module, for example by the switching on or completion of an electronic circuit by the action of the activation module. Suitable electronic arrangements which may achieve this function are known in the art.

20 The control module is adapted to receive said activating signal from the activation module when said user provides said activating input. Suitable adaptations and arrangements of the control module which may provide this function are known in the art.

25 The control module is also adapted to send an engagement signal to a braking system in said vehicle when the control module receives an activating signal from the activation module to engage said braking system to slow and/or stop said vehicle. Suitable electronic arrangements which may enable the control module to send said engagement signal to the braking system are known in the art.

By engaging a braking system in said vehicle we mean that the braking system is put into a state which slows the vehicle, preferably to a stop. The vehicle then preferably remains stopped with the braking system engaged, preferably fully engaged.

30 The inventors have found that the device when fitted to a vehicle, for example a large commercial vehicle, can reduce the risk of accidents caused by the vehicle moving uncontrollably, for example when the driver's ability to control the vehicle is reduced whilst the vehicle is moving, by allowing a user other than a driver of said vehicle to activate a braking system.

The user other than the driver of the vehicle may be able to recognise when a driver's ability to control the vehicle is reduced, for example if the driver experiences the sudden onset of an illness and/or becomes unresponsive and/or allows the vehicle to perform an unsafe manoeuvre, for example mounting a roadside kerb. Once the user other than the driver of the vehicle has recognised that the driver's ability to control the vehicle has reduced, the user may then activate the device and cause the vehicle to slow, preferably to a stop, in a safe manner.

Without the device fitted, when a vehicle moves uncontrollably, for example when the driver's ability to control the vehicle is reduced whilst the vehicle is moving, a user other than a driver of said vehicle would find it very difficult to gain control of the vehicle and/or bring the vehicle to a safe controlled stop, mainly due to the driver blocking access to the various controls of the vehicle.

Therefore the device may increase the safety of a vehicle fitted with the device. The device when fitted to vehicles may reduce the number of accidents caused by such vehicles moving uncontrollably. The device when fitted to a vehicle may prevent accidents caused by the driver's ability to control the vehicle being reduced whilst the vehicle is moving.

Furthermore, the inventors have found that in some circumstances the user other than the driver may activate the device accidentally or when mistakenly concluding that the driver's ability to control the vehicle has reduced. If the device was configured to be "latched" in an active mode once activated, then the accidental or mistaken activation by said user other than said driver would inevitably cause the vehicle to slow and suitably stop before the device can be reset and the vehicle continue on its journey. The device of this first aspect is configured so that the activation module ceases sending said activating signal to the control module when said user stops providing said activating input. The device is also configured to cease sending said engagement signal when the control module stops receiving said activating signal from the activation module (i.e. when the activation module ceases sending said activating signal) which then disengages said braking system and therefore ceases to slow and/or stop said vehicle. Therefore the device of this first aspect can cease slowing and/or stopping the vehicle when the user other than the driver ceases providing the activating input, for instance when the user realises the activation of the device was unnecessary after communicating with the driver, or if the user unintentionally provides the activating input (e.g. the user knocks an activating lever or button).

Vehicles in which the device is suitable for use include motor vehicles. Suitably said vehicle is a motor vehicle. Said vehicle may be an automobile. Said vehicle may be large commercial vehicle, for example a lorry, a light goods vehicle, a heavy goods vehicle, a waste collection vehicle, a bus or a coach. Suitably said vehicle is a lorry. Suitably said vehicle is a waste collection vehicle.

The seriousness of accidents caused by a driver losing the ability to control a vehicle increases with the size and/or weight of the vehicle. Therefore the device of this first aspect is particularly advantageous when used in a large commercial vehicle, in particular when used in a lorry or a waste collection vehicle. Also, waste collection vehicles are commonly operated by
5 a crew and therefore are likely to have a crew member in the vehicle who would be able to activate the device in the event of the driver losing the ability to control the vehicle.

Suitably the control module is adapted to send a disengagement signal to an accelerator of said vehicle when the control module receives said activating signal from the activation module, to at least partially disengage said accelerator. Suitably said disengagement signal
10 disengages said accelerator. Suitably said disengagement signal fully disengages said accelerator.

The control module may be configured to send a signal which limits the accelerator (to limit the revolutions or "revs"/RPM of the engine) to a limit which allows the vehicle to slow in a controlled manner through activation of the braking system.

15 Alternatively, the control module may be configured to send a signal to a rev limiter module which is configured to perform the function of limiting the revolutions of the engine discussed above. Suitably the control module is adapted to engage a rev limiter of said vehicle when the control module receives said activating signal from the activation module, to limit a power output of an engine of said vehicle to a set value.

20 Suitable electronic arrangements for allowing the control module to send a disengagement signal to an accelerator of said vehicle, or to a rev limiter module, are known in the art. Large commercial vehicles are commonly fitted with rev limiter modules and the device of this first aspect can be suitably adapted to be connected to said rev limiter in such a vehicle in order to engage or activate said rev limiter, as described above, when the control module receives said
25 activating signal from the activation module. Suitably the device is adapted to communicate with an electronic control system in said vehicle in order to engage or activate said rev limiter by using a controller area network (also known as a CAN bus) protocol.

The inventors have found that when using a device of this first aspect which is adapted to send said disengagement signal to an accelerator, or to a rev limiter module of said vehicle, said
30 vehicle can be slowed or stopped and therefore brought under control more effectively by at least partially disengaging the accelerator.

The inventors have also found that in some instances when a driver's ability to control a vehicle is reduced, for example when the driver has a seizure, the driver may involuntarily press down on the vehicle's accelerator pedal causing the vehicle to accelerate or at least
35 maintain driving power to the vehicle's wheels. This pressing down on the accelerator pedal

would counteract the stopping function of the emergency brake application provided by the device and therefore the device being adapted to send a disengagement signal to the accelerator ensures the accelerator does not counteract the emergency stop, providing a further improvement in safety as the stopping process becomes more effective and/or the
5 stopping distance of the vehicle in such an emergency is reduced.

In some embodiments, the disengagement signal fully disengages said accelerator. By the accelerator being disengaged we mean to refer to a state of the accelerator (or throttle) which causes an engine of said vehicle to idle at a minimum RPM set for said engine and/or for little or no driving power to be supplied to the vehicle's wheels.

10 The control module may be adapted to send said disengagement signal by communicating with an electronic control system in said vehicle. For example, the control module may be adapted to send said disengagement signal by communicating with said vehicle's body builder module, for example using a standard speed control pin socket. A body builder module is an
15 interface panel fitted to a vehicle by the manufacturer which allows a vehicle fitter (also known as a vehicle body builder) to provide auxiliary functions to the vehicle through the interface when adapting the vehicle for a specific use, for example for use as a waste collection vehicle. Suitable communication routes, protocols and associated hardware and/or software required are known in the art.

Suitably the activation module is arranged inside said vehicle.

20 Suitably the activation module is arranged inside said vehicle within reach of said user other than said driver of said vehicle, suitably within reach of a user sitting on a passenger seat of said vehicle. Suitably the activation module is arranged on the dashboard of said vehicle. Suitably the activation module is arranged at a central position within said vehicle. Suitably such central positioning of the activation module allows the activation module to be manually
25 activated by a user sitting in any seat within the vehicle. Suitably the activation module is arranged within arm's reach of a user sitting in any seat within the vehicle, suitably when said user is wearing a seat belt.

The activation module being arranged inside said vehicle allows a user other than the driver who is inside the vehicle to have access to the activation module in order to activate the
30 device, for example in case of the driver's ability to control the vehicle being reduced.

Suitably the activation module is arranged inside said vehicle and the activation module is adapted to receive a manual activating input from said user.

The device may comprise more than one activation module. Each activation module may be located in said vehicle near to where a crew member would sit when travelling in said vehicle.

For example, one activation module may be located within reach of a user sitting on a passenger seat of said vehicle beside a driver's seat and one activation module may be located within reach of a user sitting on a passenger seat of said vehicle behind a driver's seat.

In such embodiments, the device may be activated by either activation module.

- 5 In such embodiments the device may be activated by a user (or crew member) sitting either on a passenger seat beside or behind a driver's seat, or may be activated by any one of several different users (or crew members) sitting on different passenger seats in said vehicle.

10 An activation module may be arranged on the outside of said vehicle. The activation module arranged on the outside of said vehicle may be the only activation module present in the device or it may be a further activation module.

15 An activation module may be arranged on the outside of the vehicle near to where a user other than the driver, for example a crew member operating said vehicle, would be standing in order to operate said vehicle. For example, the activation module may be arranged on the outside of said vehicle at the rear of said vehicle. Suitably the activation module is arranged on the outside of said vehicle at a height that could be easily reached by a user.

The inventors have found that the activation module arranged on the outside of the vehicle allows a crew member who is not inside the vehicle to activate the device to stop the vehicle, in a case of the driver's ability to control the vehicle being reduced.

20 In some embodiments, the device suitably comprises an activation module arranged inside said vehicle and an activation module arranged on the outside of said vehicle.

The control module is adapted to send an engagement signal to a braking system in said vehicle when the control module receives said activating signal from the activation module, to engage said braking system to slow and/or stop said vehicle.

25 Suitably said engagement signal is adapted to engage said braking system in a pulsed braking operation.

Pulsed braking may be known in the art as cadence braking. Suitably said pulsed braking operation prevents the wheels of said vehicle from locking and therefore may prevent said vehicle from skidding uncontrollably after said braking system is engaged.

30 The inventors have found that when the engagement signal engages the brakes of the braking system in a pulsed braking operation, the vehicle can be brought to a more controlled stop than if the braking system were to be fully engaged by the engagement signal.

Suitably said braking system is a parking brake system.

Suitably the braking system which the control module is adapted to engage is a parking brake.

Suitably said braking system is an air brake system.

In some embodiments, the activation module and the control module are adapted to vary a strength of said activating signal and said engagement signal respectively to vary a strength of said engaging of said braking system according to a strength of said activating input provided by said user. Suitably wherein the activation module comprises a lever for receiving said manual activating input from said user, the strength of said manual activating input from said user suitably determines the strength of said activating signal and said engagement signal and therefore said strength of said engaging of said braking system.

Suitably the activation module comprises a lever for receiving said manual activating input from said user and the strength of said manual activating input from said user determines the strength of said activating signal and said engagement signal and therefore said strength of said engaging of said parking brake system in a pulsed braking operation.

The device of this first aspect may comprise a brake module adapted to:

receive said engagement signal from the control module; and
engage said braking system in said vehicle when the brake module receives said engagement signal to slow and/or stop said vehicle.

Therefore the control module may be adapted to send said engagement signal to the brake module when the control module receives said activating signal from the activation module to engage said braking system to slow and/or stop said vehicle.

When the braking system is an air brake system, for example a parking brake which is an air brake system, the brake module may be adapted to engage the air brake system by depressurising the air brake system. The brake module may comprise a valve for controlling air pressure in said braking system.

By engage the air brake system by depressurising the air brake system we mean that the brake module can be activated by the control module to reduce the air pressure in the air brake system sufficiently to allow the air brake to move to a state which prevents the vehicle from moving, for example through the action of a spring which biases a brake pad towards contact with a brake drum, the brake pad previously being held in a disengaged state against the bias of the spring by the high pressure in the air brake system.

The inventors have found that the brake module, when activated, depressurising the air brake system provides a rapid engagement of the air brake system to slow and/or stop the vehicle.

The brake module may comprise a valve for releasing air pressure from the air brake system when the brake module is activated, for example a dump valve (also known as a blow off valve) arranged in a pneumatic circuit of the air brake system before an air brake control valve. Suitable valves are known in the art.

- 5 Suitably the brake module and said engagement signal are adapted to engage the air brake system by depressurising the air brake system in a pulsed manner to provide a pulsed braking operation.

A pulsed braking operation may be achieved by a pulsed engagement signal sent from the control module to the brake module, producing a pulsed depressurisation of the air brake system wherein between periods of depressurisation the air brake system is re-pressurised. During the periods of depressurisation the air brake system will be engaged, for example through the action of a spring biasing a brake pad against a brake drum, and during periods of re-pressurisation the air brake system will be disengaged, for example by the air brake system re-pressurising sufficiently for the air pressure in the system to lift a brake pad off a brake drum against the bias of a spring.

Such a pulsed braking operation may bring the vehicle to a controlled, safe stop.

In embodiments wherein the activation module and the control module are adapted to vary a strength of said activating signal and said engagement signal respectively to vary a strength of said engaging of said braking system according to a strength of said activating input provided by said user, the strength of said engaging of said braking system is determined by the frequency of said pulsed engagement signal and/or by the absolute or relative duration of each pulse of engagement signal and periods between said pulses. For example, longer durations of pulses of engagement signal (when the braking system will be engaged) and shorter durations of periods between said pulses (when the braking system will be disengaged), will cause the strength of said braking to increase.

In some embodiments, the device is adapted so that at a certain set speed threshold of said vehicle, said braking system fully engages and/or said accelerator fully disengages to stop the vehicle, suitably until the device receives a reset input. Therefore in such embodiments the control module is adapted to fully apply said braking system, after the device has been activated by said user, when a speed of said vehicle has been reduced to a threshold speed, suitably a speed of up to 15 kph (kilometres per hour), suitably up to 10 kph, suitably up to 8 kph, for example approximately 6 kph. In embodiments wherein said engagement signal is adapted to engage said braking system in a pulsed braking operation, such pulsed braking takes place only above said threshold speed and full application of said braking system takes place below said threshold speed.

Suitably the control module is adapted to fully disengage said accelerator, suitably via a rev limiter module, after the device has been activated by said user, when a speed of said vehicle has been reduced to said threshold speed, as defined above.

5 In such embodiments, the device can function by activating said braking system initially in a pulsed braking mode to enable a safe slowing of the vehicle whilst maintaining the vehicle's engine at low revolutions in order to maintain road grip whilst the deceleration of the vehicle is occurring (full disengagement of the accelerator during deceleration may lead to a reduction in grip and the possibility of sliding and/or skidding). Once the vehicle speed has been reduced to a relatively low threshold level, the inventors have found that if pulsed braking and rev
10 limiting is continued then the vehicle can creep forwards at low speed which may continue to pose a safety risk to those inside or in the vicinity of the vehicle. Therefore at a certain threshold speed, the device may advantageously operate to fully engage the braking system and fully disengage the accelerator in order to prevent the continued movement of the vehicle and bring the vehicle safely to a complete stop.

15 Suitably the device is adapted to communicate with an electronic control system in said vehicle to receive said signals by using a controller area network (also known as a CAN bus) protocol, in order to obtain vehicle speed information to allow the control unit to determine whether the vehicle speed is above or below said threshold speed. Such controller area network protocols and associated hardware and/or software required to allow such communication are known in
20 the art.

Suitably the device comprises at least one connection port to facilitate communication of the device with said electronic control system in said vehicle. Suitably the device comprises a housing. Suitably the housing comprises the at least one connection port and the control module. Suitably the housing is adapted to allow placement of the housing in a vehicle,
25 suitably on or under a dashboard in said vehicle, for example the housing suitably has a size and shape to allow such placement without obstructing a driver.

The inventors have found the device being adapted to communicate with an electronic control system in said vehicle facilitates the fitting of the device to an existing vehicle. This means the device and its fitting can be provided in a more cost-effective manner than would otherwise be
30 possible.

In some embodiments, at the threshold speed (of suitably up to 10 kph) the control module may be adapted to enter a "latched mode" or an "engaged latched mode". Therefore the control module may be adapted to not cease sending said engagement signal when the control module stops receiving said activating signal from the activation module, when said
35 speed of said vehicle has been reduced to the threshold speed.

In such embodiments, the device has a “non-latching” engaged mode when the vehicle is travelling at a speed above the threshold speed and a “latching” engaged mode when the vehicle is travelling at a speed below the threshold speed. Therefore when the device is activated by the required activating input from the user other than the driver and the vehicle is travelling above the threshold speed, the control module will cease sending said activating signal to the control module when said user stops providing said activating input. If the user other than the driver continues to provide said activating input until the vehicle has slowed by the operation of the device to a speed below the threshold speed, the control module will not cease sending said activating signal to the control module when said user stops providing said activating input. Suitably the device will then require a reset operation to take place before the braking system can be disengaged and the vehicle can be driven normally again.

In some embodiments of the device of this first aspect, the control module is adapted to:

- change from an active mode to an engaged mode once said activating signal is received from the activation module; and
- change from said engaged mode to said active mode when a reset input is received by the control module.

Suitably the reset input triggers the control module to return the device to an active mode after the device has been activated, for example by a crew member, once an emergency situation has passed or has been dealt with by the device operating to slow and/or stop the vehicle.

- By active mode we mean a mode whereby the device is ready to be activated by a user to slow and/or stop said vehicle.

By engaged mode we mean a mode whereby the device has been activated by a user to slow and/or stop said vehicle, i.e. wherein the device is sending said engagement signal to said braking system in said vehicle to slow and/or stop said vehicle.

- In such embodiments, the control module is adapted to change from said engaged mode to said active mode when said user stops providing said activating input when a speed of said vehicle is above the threshold speed (of suitably up to 10 kph), without the reset input being received by the control module.

- In such embodiments, the control module is suitably adapted to change from said engaged mode to said active mode only when a reset input is received by the control module, when a speed of said vehicle is below the threshold speed (of suitably up to 10 kph).

Therefore the device suitably requires a reset input if the device is activated and the speed of the vehicle reaches the threshold value, but does not require a reset input if the device is activated and the speed of the vehicle does not reach the threshold value.

5 Suitably the control module is adapted so that the reset input disengages said braking system, via the brake module if present, when the reset input is provided.

The device may comprise a switch, for example a push button which must be actuated by a user to provide the reset input and cause the control module to move the device from an engaged mode to an active mode.

10 The control module may be adapted so that the reset input requires a key. The control module may be adapted to require a reset input from a remote location, for example via a telecommunication signal. For example, the control module may require a reset input from a remote location where a person overseeing the operation of several devices of the present invention is present and who must give permission for the device to be reset and therefore allow the continued normal operation of the vehicle.

15 The control module may be adapted to receive said reset input when an engine of said vehicle is switched off and then on again by said driver or said user.

Suitably the control module is adapted to receive said reset input when a parking brake control of said vehicle is activated by said driver or said user.

20 Therefore the control module may be configured to require said actions to be completed in order for the device to be "reset", i.e. return to an "active mode" after being in an "engaged mode".

In some embodiments, the device comprises a driver override module;

wherein the driver override module is adapted to:

receive a driver override activating input from said driver; and

25 send a driver override signal to the control module when said user provides said override activating input;

wherein the control module is adapted to:

30 cease sending said engagement signal when the control module receives said driver override signal from the driver override module to disengage said braking system and cease to slow and/or stop said vehicle.

Suitably the driver override module comprises a button located within reach of said driver in a driver's seat of said vehicle.

5 The inventor's have found that the driver override module advantageously provides a way for the driver to stop an emergency braking procedure which has been initiated by a user other than the driver activating the device, when the driver deems that it is unnecessary or recognises that the device has been activated accidentally.

In such embodiments, the control module may be adapted to require the reset input to be provided after the activating signal has been received from the activation module and the driver override signal has been subsequently received from the driver override module.
10 Suitably the device is adapted to inform the driver that the reset input is required. The device may be adapted to inform the driver of the requirement for a reset input by a visible and/or an audible warning. Suitably the vehicle can be driven normally once the driver override activating input has been received from said driver until the reset input has been provided.

Suitably the reset input is provided by stopping the vehicle and applying a parking brake.
15 Therefore once the device has been activated and then overridden by the driver, the vehicle must be stopped and the parking brake applied to satisfy the requirement from the device. This allows the driver and/or the crew of the vehicle to check that safe operation of the vehicle can continue. However, once the activating input has stopped, the vehicle can be driven normally until the driver deems it safe to stop, apply the parking brake to reset the device and
20 check the safety of the vehicle and crew. The inventors have found that this reset functionality of the device may provide the advantageous improvement in safety whilst not overly inconveniencing the driver and crew of the vehicle in the event of an inadvertent activation of the device, which would be the case if the reset input had to be provided before the braking system engaged by the device could be disengaged, even if the driver had provided the driver
25 override activating input.

In some embodiments, the device is adapted to operate as described above in response to said driver override activating input when a speed of the vehicle is above a threshold speed, suitably up to 15 kph, suitably up to 10 kph, suitably up to 8 kph, for example approximately
30 6 kph. In such embodiments in said engaged mode, when the speed of the vehicle is below the threshold speed, the control module is adapted to not cease sending said engagement signal when the control module receives said driver override signal from the driver override module. In such embodiments, the control module is adapted to require said reset input in order for the control module to cease sending said engagement signal to said braking system.

The device may comprise a status light. The device may comprise an active status light which
35 informs a user that the device is in an active mode. The active status light may be, for example, a green light.

The device may comprise an engaged status light which informs a user that the device is in an engaged mode. The engaged status light may be, for example, a red light.

5 Suitably the device comprises an active status light, an engaged status light and a reset module which must be activated by a user in order to restore the device to an active mode from an engaged mode and in doing so switch off the engaged status light and switch on the active status light.

Suitably the control module is adapted to send a signal to an alarm module to produce an audible warning when said user provides said activating input.

10 Suitably the control module is adapted to send a signal to an alarm module to produce an audible warning when the device engages said braking system in said vehicle.

Suitably the device comprises an alarm module. Alternatively the alarm module may be a separate entity which the device is arranged in communication with.

The alarm module suitably comprises a speaker to produce said audible warning.

15 Suitably said audible warning involves an alert to any other crew members operating the vehicle and/or bystanders and/or pedestrians nearby that said vehicle is involved in an emergency stopping procedure. The other crew members operating the vehicle and/or bystanders and/or pedestrians may then take appropriate action to protect themselves from the vehicle.

20 By audible warning we mean a sound emitted by the alarm module which is sufficiently loud to be heard by a person outside the vehicle who may be at risk of being struck by the vehicle, suitably whilst the vehicle's engine is running.

25 Said alarm module or speaker may be incorporated into said vehicle, for example during manufacture of said vehicle, for example as part of said vehicle's electronic control system and/or reversing warning system. Suitable alarm modules or speakers for use with the device are known in the art.

Suitably the control module is adapted to send a signal to produce a visible warning when said user provides said activating input.

The device may comprise a warning light adapted to illuminate when the control module sends said engagement signal to said braking system in said vehicle.

30 Alternatively the warning light may be a separate entity which the device is arranged in communication with or may be incorporated into said vehicle, for example during manufacture

of said vehicle, for example as a hazard light, a work light or a strobe light which some large commercial vehicles are fitted with.

Such a warning light may alert any other crew members operating the vehicle and/or bystanders and/or pedestrians nearby that said vehicle is involved in an emergency stopping procedure. The other crew members operating the vehicle and/or bystanders and/or pedestrians may then take appropriate action to protect themselves from the vehicle.

Suitably the device is adapted to communicate with an electronic control system in said vehicle to send said engagement signal to said braking system and optionally to send said disengagement signal to said accelerator.

10 By electronic control system we mean the electrical vehicle management system which may be connected to the vehicle's accelerator and any speaker or warning light present, for example.

According to a second aspect of the present invention, there is provided a vehicle comprising a device according to the first aspect.

15 The suitable features and advantages of the vehicle and device of this second aspect are as described above in relation to the first and aspect.

Suitably the vehicle is a large commercial vehicle. Suitably the vehicle is a waste collection vehicle, suitably operated by at least one crew member other than the driver.

20 According to a third aspect of the present invention, there is provided a method of preventing the accidental application of an emergency braking system of a vehicle, the method comprising the steps of:

a) after activation of said emergency braking system by an activating input from a person other than a driver of said vehicle, detecting the absence of said activating input; and

b) disengaging a braking system in said vehicle when said absence of said activating input is detected.

Suitably the steps of the method are carried out in the order step a) followed by step b).

Suitably step a) is preceded by the steps of:

1) detecting an activating input from a person other than a driver of said vehicle; and

2) engaging a braking system in said vehicle when said activating input is detected to slow and/or stop said vehicle.

Suitably the method is carried out by a device according to the first aspect.

The inventors have found that performing the method in relation to a vehicle, for example a large commercial vehicle, can reduce the risk of accidents caused by the vehicle moving uncontrollably, for example when the driver's ability to control the vehicle is reduced whilst the vehicle is moving, by allowing a user other than a driver of said vehicle to activate a braking system. The method may achieve this whilst preventing the accidental application of an emergency braking procedure in a vehicle, which could cause a hazard in itself.

Therefore performing the method may improve the safety of a vehicle. The method when performed on or by a vehicle may reduce the number of accidents caused by a driver's ability to control a vehicle being reduced whilst the vehicle is moving, whilst avoiding accidental application of an emergency braking procedure in a vehicle. The method when performed on or by a vehicle may prevent accidents caused by a driver's ability to control a vehicle being reduced whilst the vehicle is moving.

According to a fourth aspect of the present invention, there is provided a device for enabling a user other than a driver of a vehicle to slow and/or stop said vehicle, the device comprising an activation module, a control module and a brake module;

wherein the activation module is adapted to:

receive an activating input from said user;

send an activating signal to the control module when said user provides said activating input; and

cease sending said activating signal to the control module when said user stops providing said activating input;

wherein the control module is adapted to:

receive said activating signal from the activation module when said user provides said activating input;

send an engagement signal to the brake module when the control module receives said activating signal from the activation module, to engage said braking system to slow and/or stop said vehicle; and

cease sending said engagement signal when the control module stops receiving said activating signal from the activation module, to disengage said braking system and cease to slow and/or stop said vehicle;

wherein the brake module is adapted to:

receive said engagement signal from the control module; and

engage a braking system in said vehicle when the brake module receives said engagement signal to slow and/or stop said vehicle.

- 5 The device of this fourth aspect may have any of the suitable features and advantages described in relation to the first aspect.

According to a fifth aspect of the present invention, there is provided a device for enabling a user other than a driver of a vehicle to slow and/or stop said vehicle, the device comprising an activation module, a control module and a driver override module;

- 10 wherein the activation module is adapted to:

receive an activating input from said user; and

send an activating signal to the control module when said user provides said activating input;

wherein the driver override module is adapted to:

- 15 receive an override activating input from said driver; and

send a driver override signal to the control module when said user provides said override activating input;

wherein the control module is adapted to:

- 20 receive said activating signal from the activation module when said user provides said activating input;

send an engagement signal to a braking system in said vehicle when the control module receives said activating signal from the activation module, to engage said braking system to slow and/or stop said vehicle; and

- 25 cease sending said engagement signal when the control module receives said driver override signal from the driver override module to disengage said braking system and cease to slow and/or stop said vehicle.

The device of this fifth aspect may have any of the suitable features and advantages described in relation to the first aspect.

According to a sixth aspect of the present invention, there is provided a device for enabling a user other than a driver of a vehicle to slow and/or stop said vehicle, the device comprising an activation module, a control module and a driver override module;

wherein the activation module is adapted to:

- 5 receive an activating input from said user;
- send an activating signal to the control module when said user provides said activating input; and
- cease sending said activating signal to the control module when said user stops providing said activating input

- 10 wherein the driver override module is adapted to:

 receive an override activating input from said driver; and

 send a driver override signal to the control module when said user provides said override activating input;

wherein the control module is adapted to:

- 15 receive said activating signal from the activation module when said user provides said activating input;
- send an engagement signal to a braking system in said vehicle when the control module receives said activating signal from the activation module, to engage said braking system to slow and/or stop said vehicle;
- 20 cease sending said engagement signal when the control module stops receiving said activating signal from the activation module to disengage said braking system and cease to slow and/or stop said vehicle; and
- cease sending said engagement signal when the control module receives said driver override signal from the driver override module to disengage said braking system and
- 25 cease to slow and/or stop said vehicle.

The device of this sixth aspect may have any of the suitable features and advantages described in relation to the first aspect.

According to a seventh aspect of the present invention, there is provided a device for enabling a user other than a driver of a vehicle to slow and/or stop said vehicle, the device comprising an activation module, a control module and a driver override module;

wherein the activation module is adapted to:

- 5 receive an activating input from said user;
- send an activating signal to the control module when said user provides said activating input; and
- cease sending said activating signal to the control module when said user stops providing said activating input

- 10 wherein the driver override module is adapted to:

 receive an override activating input from said driver; and

 send a driver override signal to the control module when said user provides said override activating input;

wherein the control module is adapted to:

- 15 receive said activating signal from the activation module when said user provides said activating input;
- send an engagement signal to a braking system in said vehicle when the control module receives said activating signal from the activation module, to engage said braking system to slow and/or stop said vehicle;
- 20 cease sending said engagement signal when the control module stops receiving said activating signal from the activation module to disengage said braking system and cease to slow and/or stop said vehicle;
- cease sending said engagement signal when the control module receives said driver override signal from the driver override module to disengage said braking system and
- 25 cease to slow and/or stop said vehicle; and
- not cease sending said engagement signal when the control module stops receiving said activating signal from the activation module or when the control module receives said driver override signal from the driver override module, when a speed of said vehicle has been reduced to a threshold speed of up to 15 kph.

The device of this seventh aspect may have any of the suitable features and advantages described in relation to the first aspect.

According to the present invention, there is provided a device, vehicle or method substantially as described herein, and/or a device, vehicle or method substantially as described herein with
5 reference to the accompanying Figures and/or a device, vehicle or method substantially as shown in the accompanying Figures.

Brief Description Of The Drawings

For a better understanding of the invention, and to show how example embodiments may be carried into effect, reference will now be made to the accompanying drawings in which:

10 Figure 1 is a schematic diagram of a device of the first aspect of the present invention.

Figure 2 is a perspective view of a vehicle of the second aspect of the present invention.

Figure 3 is a flow diagram representing the method of the third aspect of the present invention.

Figure 4 is a decision tree which illustrates the function of the device, system, vehicle and method of the present invention.

15 Detailed Description Of The Example Embodiments

Figure 1 shows device (100) adapted to enable a user other than a driver of a vehicle to slow and/or stop said vehicle, for example when the driver's ability to control the vehicle is reduced. The device (100) comprises a control module (101), an activation module (102), an accelerator connector (103), a brake module (104), an alarm module (105), a light connector (106) and a
20 driver override module (107).

The control module (101) comprises the connections shown by the dotted lines for sending and receiving signals in order for the device (100) to perform its function. The device (100) comprises activation module (102) connected to the control module (101) so that the activation module (102) can send an activating signal to the control module (101) when a user activates
25 the activation module (102). The activation module (102) comprises a lever (not shown) which can be activated by a user pushing the lever to an "on" position, for example using a hand. The lever is a non-latching switch with normally open contacts which returns to an "off" position when the user stops pushing the lever to the "on" position. The activation module (102) and the lever are arranged in the vehicle near the seating position of at least one vehicle crew
30 member (other than the driver).

The control module (101) is adapted to receive the activating signal from the activation module (102). The control module (101) is connected to the accelerator connector (103) which in use

is inserted into a vehicle's body builder module so that a disengaging signal can be sent from the control module (101) to the accelerator, in order to disengage the accelerator, suitably via a rev limiter module. The accelerator connector (103) is a connector which co-operates with a standard speed control pin of the vehicle's body builder module. In some vehicles a digital high input would be required to send the disengagement signal to the accelerator through the standard speed control pin of the vehicle's body builder module. In other vehicles a digital low input would be required. The device (100) is adapted to allow adjustment of the control module (101) by a technician fitting the device (100) to a vehicle to provide either a digital high or a digital low signal as required to disengage the accelerator in that particular vehicle.

10 The control module (101) is connected to the brake module (104). The brake module (104) comprises a pressure dumping solenoid valve, for example a 1/4 inch BSP, 3-port, NO, 3/2, 1 exhaust, 10 bar pressure rated solenoid dump valve (supplied by Pownell), for fitting to a pneumatic circuit of a parking brake system in order for the brake module (104) to perform its intended function of applying the parking brake of the vehicle when the device is activated.

15 The control module (101) is connected to the alarm module (105). Alarm module (105) comprises a speaker for producing an audible warning when the device is activated. For example, the alarm module may be programmed to sound the warning: "Caution, vehicle approaching".

20 The control module (101) is connected to the light connector (106). The light connector (106) allows the control module to be connected to the electronic system of the vehicle which controls the hazard, working or strobe lights of the vehicle. The light connector (106) is a connector which co-operates with the switching system of the vehicle's hazard, working or strobe lights.

25 The control module (101) is connected to the driver override module (107). The driver override module (107) comprises a push button located within arm's reach of a driver's seat of the vehicle in order to allow a driver to quickly override the activation of the device in the event of an accidental activation. The override push button is a latching switch with normally open / normally closed contacts. The override push button is provided with a ring of LED lights which illuminate when the button is pressed to indicate activation of the driver override module. The override push button is configured so that twisting the button resets the switch to an "off" position.

35 Figure 2 shows vehicle (200) fitted with device (100). The vehicle (200) is a waste collection vehicle comprising an air brake system, an example of a vehicle type in which the device (100) of the present invention may be particularly useful. The vehicle (200) also comprises an electronic control system and a body builder module. The accelerator connector (103, not shown) is connected to the vehicle's body builder module (not shown) to enable the control

module (101) of the device (100) to control the accelerator of the vehicle (200), when the device (100) is activated.

5 Brake module (104) as described above in relation to Figure 1 is fitted to the pneumatic circuit of the vehicle's air brake system between a park brake lever and an air control shuttle valve which provides air pressure to the park brake actuators. The brake module (104) comprises a solenoid dump valve arranged to depressurise the pneumatic circuit when activated by the control module (101).

The activation module (102) is arranged on the dashboard of the vehicle (200) adjacent to a passenger seat.

10 Figure 4 shows a decision tree which illustrates the function of the device, system, vehicle and method of the present invention. This decision tree is implemented by an appropriate arrangement of electronic circuitry in a control module of the device, system or vehicle. A skilled person with knowledge of the decision tree of Figure 4 would be able to implement this decision tree using known electronic components and arrangements.

15 The decision process is carried out by the device or method of the present invention as follows when the device or system and the pressure dumping solenoid valve is fitted to a vehicle as described above, the vehicle having an engine, a gear system, an air brake system arranged as a parking brake and an electronic control system which uses a controller area network (also known as a CAN bus) protocol. The air brake system comprises a park brake lever for
20 controlling the engaged or disengaged state of the air brake system, in normal operation.

Each decision (enclosed in a diamond shape in Figure 4) is made by the control module (101) of the device (100) using electronic circuitry and the components described herein (or standard components where appropriate). The "Yes" and "No" outcomes produce either a decision by the device to take no action or a decision to change the mode of the device (100) from an
25 "active mode" into an "engaged mode", "engaged latched mode" or an "active reset mode", or back to an "active mode" when the device is reset.

In the "active mode", the device (100) is on, monitoring vehicle speed and ready to be triggered by the lever of the activation module (102).

30 In the "engaged mode", the control module (101) functions to apply a parking brake of the vehicle in a pulsed braking mode, limit the revs of the vehicle's engine, sound a warning message and activate hazard, working or strobe lights of the vehicle. In the "engaged mode", the control module (101) does not require a reset procedure to be carried out in order to move to the "active mode".

In the “engaged latched mode”, the control module (101) functions to fully apply the parking brake of the vehicle and fully disengage the accelerator of the vehicle, whilst sounding the warning message and activating hazard, working or strobe lights of the vehicle. In the “engaged latched mode”, the control module (101) does require a reset procedure to be carried out in order to move to the “active mode”.

In the “active reset mode” the control module (101) functions as in the “active mode” but the device (100) sounds an instruction to the driver to stop the vehicle and apply the parking brake in order to reset the device (100). In the “active reset mode”, the control module (101) requires a reset procedure to be carried out in order to move to the “active mode”.

10 The device (100) operates according to the decision tree of Figure 4 as follows. First the device decides whether the engine is on (running) or not (401), for example by using a signal input from the vehicle’s CAN bus. If the engine is not on then the device (100) does not function (not active, 402). If the engine is on (running) the device (100) is in the “active mode” (403) described above.

15 The device (100) then decides whether the vehicle speed is greater than 0 kph (404), for example using a signal input from the vehicle’s CAN bus. If the vehicle speed is not greater than 0 kph (i.e. the vehicle is not moving) the device (100) can only produce outcome (405) of taking no action.

If the vehicle speed is greater than 0 kph (i.e. the vehicle is moving), the device (100) then decides whether the lever of the activation module (102) has been pushed by a user to an “on” position (406), for example when said user notices that the driver’s ability to control the vehicle (200) has reduced, such as through a sudden onset of illness. If the lever has not been actuated then the device (100) produces outcome 407 of taking no action and the device (100) remains in the “active mode” (403).

25 If the lever has been actuated to the “on” position then the device (100) enters the “engaged mode” (408) as described above, wherein an engagement signal is sent to the brake module (104) and a disengagement signal is sent to the accelerator of the vehicle through the accelerator connector (103). The disengagement signal causes the accelerator to be limited to a set rev limit in order to reduce the driving power supplied to the vehicle’s wheels and allow the vehicle to slow safely. The engagement signal sent to the brake module (104) is a pulsed signal which causes the solenoid valve of the brake module (104) to periodically open and close which repeatedly depressurises then re-pressurises the parking brake system and therefore causes the parking brake to be applied in a pulsed manner (cadence braking) until the vehicle (200) has slowed significantly. The pulse length and the frequency of the pulsed engagement signal may be adjusted by a technician fitting the device to a vehicle to provide the maximum braking effect whilst preventing the vehicle’s wheels locking and the vehicle

skidding. The type and weight of a particular vehicle may be taken into account by the technician when adjusting the pulsed engagement signal to provide an optimum emergency braking process for that vehicle.

5 Actuating the lever also causes the activation module (102) to send signals to the alarm module (105) and to the lights of the vehicle (e.g. hazard lights, work lights or strobe lights) through the light connector (106). This provides both an audible and a visible warning to anyone near the vehicle, for example other crew members, bystanders, pedestrians and other road users so they may be alerted to the emergency situation and take appropriate action to protect themselves whilst the device (100) slows and stops the vehicle (200).

10 In the “engaged mode” (408), the device monitors the vehicle speed and decides whether the vehicle speed is less than 6 kph (409). If not, the device (100) remains in the “engaged mode” and the device decides whether the lever of the activation module (102) has been released by the user (410).

15 If at decision 410 the lever of the activation module is released by the user then the device (100) enters the “active mode” (403) wherein the device no longer applies the parking brake or limits/disengages the accelerator, allowing the vehicle to be driven normally. Therefore this functionality allows an inadvertent activation of the device (100) by a user other than the driver to be easily reversed by the user releasing the lever, and therefore not causing unnecessary inconvenience to the operation of the vehicle.

20 If at decision 410 the lever of the activation module is not released by the user, the device (100) remains in the “engaged mode” and the device decides whether the driver override module (107) has been activated (411).

25 If at decision 411 the driver override module (107) has been activated then the device enters the “active reset mode” (414) as described above, wherein the control module (101) functions as in the “active mode” but the device (100) sounds an instruction to the driver to stop the vehicle and apply the parking brake in order to reset the device (100). This allows the driver to decide that he or she is capable of the continued safe operation of the vehicle (200) and stop the emergency braking procedure initiated by the user other than the driver, whilst encouraging the driver to stop the vehicle (200) to allow the driver and the user to discuss the
30 incident and decide how to proceed. If they decide that it is safe to proceed then the device (100) can enter the “active mode” after the parking brake controls have been applied. Once the device detects that vehicle (100) has stopped and the parking brake has been applied (413), the device (100) enters the “active mode” (403).

If at decision 411 the driver override module (107) has not been activated, the device (100) remains in the “engaged mode” (408) and continues to monitor the vehicle speed, lever status of the activation module and the status of the driver override module (107).

5 If at decision 409 the speed of the vehicle is less than 6 kph, as detected by the device through the vehicle CAN bus system, the device enters the “engaged latched mode” (412) as described above, wherein the engagement signal sent by the control module to the brake module (104) becomes a continuous signal rather than a pulsed signal. This has the effect of fully applying the parking brake system to bring the vehicle (200) to a complete stop. The disengagement signal sent by the control module (101) causes the accelerator to be fully
10 disengaged and the device (100) continues to activate the sounding of the warning message and the hazard, working or strobe lights of the vehicle.

In the “engaged latched mode” (412), the vehicle is brought to a complete stop by the device (100). In the “engaged latched mode” (412) it is no longer possible for the device to enter the “active mode” (403) without the vehicle being stopped and the parking brake applied.

15 Once the vehicle (200) has been brought to a stop in a safe and controlled manner by the device (100), the device (100) remains in the “engaged latched mode” until the device has been reset by a user or the driver. When a user or the driver recognises that the emergency situation has passed or has been dealt with and normal operation of the vehicle is appropriate, the driver may reset the device (100) by applying the vehicle’s parking brake controls (decision
20 413) which provides the required reset input to the control module (101) to reset the device (100) to an “active mode” (403). The control module (101) may receive said reset input from the parking brake through the vehicle’s CAN bus system. Once the device (100) has been reset to the “active mode” (403), the control module (101) allows the parking brake system of the vehicle to be disengaged and allows the accelerator to be engaged, therefore allowing the
25 normal use of the vehicle once more. The alarm module (105) and the lights of the vehicle are also deactivated by this reset process. In the “active mode” (403), the device (100) is ready to be activated by a user once again.

In tests to simulate common emergency circumstances wherein a driver’s ability to control the vehicle has been reduced, the vehicle (200) was successfully slowed to a stop in a controlled
30 manner without the wheels of the vehicle locking, after a user pressed the button on the activation module (102). Also, the device (100) successfully prevented the vehicle from moving until the device (100) had been reset as described above.

In these tests a waste collection vehicle travelling at 46 miles per hour on a wet road surface was brought to a complete stop in a distance of approximately four lengths of the vehicle
35 without the wheels locking and the vehicle skidding/sliding.

The example embodiments described above may reduce the risk of a vehicle causing serious harm to persons or property when a driver of the vehicle loses the ability to control the vehicle, by engaging a braking system, and optionally disengaging the accelerator, when a user activates the device.

- 5 It is expected that the rate of fatal injuries caused by a driver becoming unable to control a vehicle will decrease significantly if the device, vehicle and/or method of the example embodiments are widely adopted/used, in particular by operators and/or manufacturers of large commercial vehicles.

10 In summary, the present invention provides a vehicle safety device for enabling a user other than a driver of a vehicle to stop said vehicle in an emergency. The device comprises an activation module and a control module. The activation module is adapted to receive an activating input from said user and then send an activating signal to the control module. The activation module is also adapted to cease sending said activating signal to the control module when said user stops providing said activating input. The control module is adapted to receive
15 the activating signal from the activation module and then send an engagement signal to a braking system. The engagement signal causes the braking system to engage and therefore slow the vehicle to a stop. The control module is also adapted to cease sending said engagement signal when the control module stops receiving said activating signal from the activation module, to disengage said braking system and cease to slow and/or stop said
20 vehicle. The device may be particularly useful in situations where a driver becomes unable to control the vehicle adequately, for example due to the sudden onset of an illness or injury, whilst preventing accidental activation of the emergency braking process. A vehicle comprising such a device and a method of slowing a vehicle to a stop are also provided.

25 Throughout this specification, the term “comprising” or “comprises” means including the component(s) specified but not to the exclusion of the presence of other components.

Whenever appropriate, depending upon the context, the use of the term “comprises” or “comprising” may also be taken to encompass or include the meaning “consists essentially of” or “consisting essentially of”, and may also be taken to include the meaning “consists of” or “consisting of”.

30 The optional features set out herein may be used either individually or in combination with each other where appropriate and particularly in the combinations as set out in the accompanying claims. The optional features for each aspect or exemplary embodiment of the invention as set out herein are also to be read as applicable to any other aspect or exemplary embodiments of the invention, where appropriate. In other words, the skilled person reading
35 this specification should consider the optional features for each exemplary embodiment of the invention as interchangeable and combinable between different exemplary embodiments.

Although a few preferred embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims.

5 Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

10 All of the features disclosed in this specification (including any accompanying claims, and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

15 Each feature disclosed in this specification (including any accompanying claims, and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A device for enabling a user other than a driver of a vehicle to slow and/or stop said vehicle, the device comprising an activation module and a control module;

wherein the activation module is adapted to:

5 receive an activating input from said user;

 send an activating signal to the control module when said user provides said activating input; and

 cease sending said activating signal to the control module when said user stops providing said activating input;

10 wherein the control module is adapted to:

 receive said activating signal from the activation module when said user provides said activating input;

 send an engagement signal to a braking system in said vehicle when the control module receives said activating signal from the activation module, to engage said braking system to slow and/or stop said vehicle; and

15 cease sending said engagement signal when the control module stops receiving said activating signal from the activation module, to disengage said braking system and cease to slow and/or stop said vehicle;

wherein said braking system is a parking brake system.

20 2. The device according to claim 1, wherein the activation module is adapted to receive said activating input from said user which is a manual activating input.

3. The device according to claim 2, wherein the activation module comprises a lever for receiving said manual activating input from said user.

25 4. The device according to claim 2 or claim 3, wherein the activation module and the control module are adapted to vary a strength of said activating signal and said engagement signal respectively to vary a strength of said engaging of said braking system according to a strength of said activating input provided by said user.

5. The device according to any one of the preceding claims, wherein said engagement signal is adapted to engage said braking system in a pulsed braking operation.

6. The device according to any one of the preceding claims, wherein the control module is adapted to fully apply said braking system, after the device has been activated by said user, when a speed of said vehicle has been reduced to a threshold speed of up to 10 kph.

5 7. The device according to claim 6, wherein the control module is adapted to not cease sending said engagement signal when the control module stops receiving said activating signal from the activation module, when said speed of said vehicle has been reduced to the threshold speed.

8. The device according to any one of the preceding claims, wherein the control module is adapted to:

10 change from an active mode to an engaged mode once said activating signal is received from the activation module; and

change from said engaged mode to said active mode when a reset input is received by the control module.

15 9. The device according to claim 8, wherein the control module is adapted to receive said reset input when a parking brake control of said vehicle is activated by said driver or said user.

10. The device according to any one of the preceding claims, wherein the device comprises a driver override module;

wherein the driver override module is adapted to:

receive a driver override activating input from said driver; and

20 send a driver override signal to the control module when said user provides said override activating input;

wherein the control module is adapted to:

25 cease sending said engagement signal when the control module receives said driver override signal from the driver override module to disengage said braking system and cease to slow and/or stop said vehicle.

11. The device according to claim 10, wherein the driver override module comprises a button located within reach of said driver in a driver's seat of said vehicle.

12. A vehicle comprising a device according to any one of claims 1 to 11.

13. A method of preventing the accidental application of an emergency braking system of a vehicle, the method comprising the steps of:

a) after activation of said emergency braking system by an activating input from a person other than a driver of said vehicle, detecting the absence of said activating input; and

5 b) disengaging said braking system in said vehicle when said absence of said activating input is detected;

wherein said braking system is a parking brake system.

14. The method according to claim 12, wherein step b) of disengaging said braking system is also carried out when a driver override activating input is provided to said emergency braking
10 system by a driver of said vehicle.