operate. In this situation, the driver of the vehicle often wastes a significant amount of time leaving the vehicle to check the tow hitch connection each time a new trailer is hitched to the vehicle.

The present invention seeks to provide an improved safety arrangement.

According to one aspect of the present invention, there is provided a safety arrangement for use with a tow hitch system for connecting a trailer to a vehicle, the tow hitch system comprising a first part and a second part that are releasably attachable to one another, one part being carried by the vehicle and the other part being carried by the trailer, wherein the safety arrangement comprises: a connection sensor which is configured to sense the status of the connection between the first and second parts of the tow hitch system and to provide a connection error signal in the event that the first and second parts are not attached securely to one another; and a movement restriction module which is configured to receive the connection error signal from the connection sensor, the movement restriction module being operable, in use, to restrict movement of the vehicle upon receipt of the connection error signal from the connection sensor so that movement of the vehicle is restricted in the event that the parts of the tow hitch system are not attached securely to one another.

Preferably, the movement restriction module is, in use, connected to the fuel supply system of a vehicle and is configured to cut off the fuel supply to the engine of the vehicle upon receipt of the connection error signal from the connection sensor.

Conveniently, the movement restriction module is, in use, connected to the brake system of the vehicle and is configured to activate the brake system to restrict movement of the vehicle upon receipt of the connection error signal from the connection sensor.

Advantageously, wherein the movement restriction module is, in use, connected to the ignition system of the vehicle and is configured to disable the ignition system to immobilise the vehicle upon receipt of the connection error signal from the connection sensor.

Preferably, the arrangement further comprises: a time delay module which is configured to delay the transmission of the connection error signal to the movement restriction module by a time delay value.

Conveniently, the time delay value is approximately 7 seconds.

Advantageously, the time delay module is configured to provide a variable time delay value.

Preferably, the arrangement further comprises: a vehicle movement direction sensor which is configured, in use, to sense the direction in which the vehicle will move, the vehicle movement detection system being configured to provide an override signal to the movement restriction module which deactivates the movement restriction module so that the movement restriction module does not restrict movement of the vehicle if the vehicle movement direction sensor senses that the vehicle will move in a direction which is at least partly towards the trailer.

Conveniently, the vehicle movement direction sensor is connected to the power supply of a reversing light of the vehicle to detect when power is supplied to the reversing lights.

Advantageously, the arrangement further comprises: a bypass switch, which, when activated, is configured to bypass the movement restriction module so that the movement restriction module does not restrict the movement of the vehicle.

Preferably, the connection sensor comprises a position sensor which is configured to sense the position of a tow hitch lever which is, in use, operable to connect and disconnect the first and second parts of the tow hitch system.

According to another aspect of the present invention, there is provided a vehicle comprising the safety arrangement as defined in of any one of the claims hereinafter.

According to a further aspect of the present invention, there is provided a method of connecting a trailer to a vehicle using a tow hitch system, the tow hitch system comprising a first part and a second part that are releasably attachable to one another, one part being carried by the vehicle and the other part being carried by the trailer, wherein the method comprises: engaging the first and second parts of the tow hitch system to one another; sensing the status of the connection between the first and second parts of the tow hitch system using a connection sensor and providing a connection error signal in the event that the first and second parts are not attached securely to one another; and restricting movement of the vehicle using a movement restriction module in response to a connection error signal from the connection sensor so that movement of the vehicle is restricted in the event that the parts of the tow hitch system are not attached securely to one another.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

~~Figure 1 is a schematic diagram of a vehicle coupled to a trailer;~~

Claims

1. A safety arrangement for use with a tow hitch system for connecting a trailer to a vehicle, the tow hitch system comprising a first part and a second part that are releasably attachable to one another, one part being carried by the vehicle and the other part being carried by the trailer, wherein the safety arrangement comprises:

a connection sensor which is configured to sense the status of the connection between the first and second parts of the tow hitch system and to provide a connection error signal in the event that the first and second parts are not attached securely to one another; and

a movement restriction module which is configured to receive the connection error signal from the connection sensor, the movement restriction module being operable, in use, to restrict movement of the vehicle upon receipt of the connection error signal from the connection sensor so that movement of the vehicle is restricted in the event that the parts of the tow hitch system are not attached securely to one another.

2. The safety arrangement of claim 1, wherein the movement restriction module is, in use, connected to the fuel supply system of a vehicle and is configured to cut off the fuel supply to the engine of the vehicle upon receipt of the connection error signal from the connection sensor.

3. The safety arrangement of claim 1 or claim 2, wherein the movement restriction module is, in use, connected to the brake system of the vehicle and is configured to activate the brake system to restrict movement of the vehicle upon receipt of the connection error signal from the connection sensor.

4. The safety arrangement of any one of the preceding claims, wherein the movement restriction module is, in use, connected to the ignition system of the

vehicle and is configured to disable the ignition system to immobilise the vehicle upon receipt of the connection error signal from the connection sensor.

5. The safety arrangement of any one of the preceding claims, wherein the arrangement further comprises:

a time delay module which is configured to delay the transmission of the connection error signal to the movement restriction module by a time delay value.

6. The safety arrangement of claim 5, wherein the time delay value is approximately 7 seconds.

7. The safety arrangement of claim 5 or claim 6, wherein the time delay module is configured to provide a variable time delay value.

8. The safety arrangement of any one of the preceding claims, wherein the arrangement further comprises:

a vehicle movement direction sensor which is configured, in use, to sense the direction in which the vehicle will move, the vehicle movement detection system being configured to provide an override signal to the movement restriction module which deactivates the movement restriction module so that the movement restriction module does not restrict movement of the vehicle if the vehicle movement direction sensor senses that the vehicle will move in a direction which is at least partly towards the trailer.

9. The safety arrangement of claim 8, wherein the vehicle movement direction sensor is connected to the power supply of a reversing light of the vehicle to detect when power is supplied to the reversing lights.

10. The safety arrangement of any one of the preceding claims, wherein the arrangement further comprises:

a bypass switch, which, when activated, is configured to bypass the movement restriction module so that the movement restriction module does not restrict the movement of the vehicle.

11. The safety arrangement of any one of the preceding claims, wherein the connection sensor comprises a position sensor which is configured to sense the position of a tow hitch lever which is, in use, operable to connect and disconnect the first and second parts of the tow hitch system.

12. A vehicle comprising the safety arrangement of any one of the preceding claims.

13. A method of connecting a trailer to a vehicle using a tow hitch system, the tow hitch system comprising a first part and a second part that are releasably attachable to one another, one part being carried by the vehicle and the other part being carried by the trailer, wherein the method comprises:

engaging the first and second parts of the tow hitch system to one another;

sensing the status of the connection between the first and second parts of the tow hitch system using a connection sensor and providing a connection error signal in the event that the first and second parts are not attached securely to one another; and

restricting movement of the vehicle using a movement restriction module in response to a connection error signal from the connection sensor so that movement of the vehicle is restricted in the event that the parts of the tow hitch system are not attached securely to one another.

operate. In this situation, the driver of the vehicle often wastes a significant amount of time leaving the vehicle to check the tow hitch connection each time a new trailer is hitched to the vehicle.

The present invention seeks to provide an improved safety arrangement.

According to one aspect of the present invention, there is provided a safety arrangement for use with a tow hitch system for connecting a trailer to a vehicle, the tow hitch system comprising a first part and a second part that are releasably attachable to one another, one part being carried by the vehicle and the other part being carried by the trailer, wherein the safety arrangement comprises: a connection sensor which is configured to sense the status of the connection between the first and second parts of the tow hitch system and to provide a connection error signal in the event that the first and second parts are not attached securely to one another; a movement restriction module which is configured to receive the connection error signal from the connection sensor, the movement restriction module being operable, in use, to restrict movement of the vehicle upon receipt of the connection error signal from the connection sensor so that movement of the vehicle is restricted in the event that the parts of the tow hitch system are not attached securely to one another; and a vehicle movement direction sensor which is configured, in use, to sense the direction in which the vehicle will move, the vehicle movement detection sensor being configured to provide an override signal to the movement restriction module which deactivates the movement restriction module so that the movement restriction module does not restrict movement of the vehicle if the vehicle movement direction sensor senses that the vehicle will move in a direction which is at least partly towards the trailer.

Preferably, the movement restriction module is, in use, connected to the fuel supply system of a vehicle and is configured to cut off the fuel supply to the engine of the vehicle upon receipt of the connection error signal from the connection sensor.

Conveniently, the movement restriction module is, in use, connected to the brake system of the vehicle and is configured to activate the brake system to restrict movement of the vehicle upon receipt of the connection error signal from the connection sensor.

Advantageously, wherein the movement restriction module is, in use, connected to the ignition system of the vehicle and is configured to disable the ignition system to immobilise the vehicle upon receipt of the connection error signal from the connection sensor.

Preferably, the arrangement further comprises: a time delay module which is configured to delay the transmission of the connection error signal to the movement restriction module by a time delay value.

In one embodiment, the time delay value is approximately 7 seconds.

In another embodiment, the time delay module is configured to provide a variable time delay value.

Conveniently, the vehicle movement direction sensor is connected to the power supply of a reversing light of the vehicle to detect when power is supplied to the reversing lights.

Advantageously, the arrangement further comprises: a bypass switch, which, when activated, is configured to bypass the movement restriction module so that the movement restriction module does not restrict the movement of the vehicle.

Preferably, the connection sensor comprises a position sensor which is configured to sense the position of a tow hitch lever which is, in use, operable to connect and disconnect the first and second parts of the tow hitch system.

According to another aspect of the present invention, there is provided a vehicle comprising the safety arrangement as defined in of any one of the claims hereinafter.

According to a further aspect of the present invention, there is provided a method of connecting a trailer to a vehicle using a tow hitch system, the tow hitch system comprising a first part and a second part that are releasably attachable to one another, one part being carried by the vehicle and the other part being carried by the trailer, wherein the method comprises: engaging the first and second parts of the tow hitch system to one another; sensing the status of the connection between the first and second parts of the tow hitch system using a connection sensor and providing a connection error signal in the event that the first and second parts are not attached securely to one another; restricting movement of the vehicle using a movement restriction module in response to a connection error signal from the connection sensor so that movement of the vehicle is restricted in the event that the parts of the tow hitch system are not attached securely to one another; and sensing, using a vehicle movement direction sensor, the direction in which the vehicle will move and providing an override signal to the movement restriction module which deactivates the movement restriction module so that the movement restriction module does not restrict movement of the vehicle if the vehicle movement direction sensor senses that the vehicle will move in a direction which is at least partly towards the trailer.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a schematic diagram of a vehicle coupled to a trailer,

Claims

1. A safety arrangement for use with a tow hitch system for connecting a trailer to a vehicle, the tow hitch system comprising a first part and a second part that are releasably attachable to one another, one part being carried by the vehicle and the other part being carried by the trailer, wherein the safety arrangement comprises:

a connection sensor which is configured to sense the status of the connection between the first and second parts of the tow hitch system and to provide a connection error signal in the event that the first and second parts are not attached securely to one another;

a movement restriction module which is configured to receive the connection error signal from the connection sensor, the movement restriction module being operable, in use, to restrict movement of the vehicle upon receipt of the connection error signal from the connection sensor so that movement of the vehicle is restricted in the event that the parts of the tow hitch system are not attached securely to one another; and

a vehicle movement direction sensor which is configured, in use, to sense the direction in which the vehicle will move, the vehicle movement detection sensor being configured to provide an override signal to the movement restriction module which deactivates the movement restriction module so that the movement restriction module does not restrict movement of the vehicle if the vehicle movement direction sensor senses that the vehicle will move in a direction which is at least partly towards the trailer.

2. The safety arrangement of claim 1, wherein the movement restriction module is, in use, connected to the fuel supply system of a vehicle and is configured to cut off the fuel supply to the engine of the vehicle upon receipt of the connection error signal from the connection sensor.

3. The safety arrangement of claim 1 or claim 2, wherein the movement restriction module is, in use, connected to the brake system of the vehicle and is

configured to activate the brake system to restrict movement of the vehicle upon receipt of the connection error signal from the connection sensor.

4. The safety arrangement of any one of the preceding claims, wherein the movement restriction module is, in use, connected to the ignition system of the vehicle and is configured to disable the ignition system to immobilise the vehicle upon receipt of the connection error signal from the connection sensor.

5. The safety arrangement of any one of the preceding claims, wherein the arrangement further comprises:

a time delay module which is configured to delay the transmission of the connection error signal to the movement restriction module by a time delay value.

6. The safety arrangement of claim 5, wherein the time delay value is approximately 7 seconds.

7. The safety arrangement of claim 5, wherein the time delay module is configured to provide a variable time delay value.

8. The safety arrangement of claim 1, wherein the vehicle movement direction sensor is connected to the power supply of a reversing light of the vehicle to detect when power is supplied to the reversing lights.

9. The safety arrangement of any one of the preceding claims, wherein the arrangement further comprises:

a bypass switch, which, when activated, is configured to bypass the movement restriction module so that the movement restriction module does not restrict the movement of the vehicle.

10. The safety arrangement of any one of the preceding claims, wherein the connection sensor comprises a position sensor which is configured to sense

the position of a tow hitch lever which is, in use, operable to connect and disconnect the first and second parts of the tow hitch system.

11. A vehicle comprising the safety arrangement of any one of the preceding claims.

12. A method of connecting a trailer to a vehicle using a tow hitch system, the tow hitch system comprising a first part and a second part that are releasably attachable to one another, one part being carried by the vehicle and the other part being carried by the trailer, wherein the method comprises:

engaging the first and second parts of the tow hitch system to one another;

sensing the status of the connection between the first and second parts of the tow hitch system using a connection sensor and providing a connection error signal in the event that the first and second parts are not attached securely to one another;

restricting movement of the vehicle using a movement restriction module in response to a connection error signal from the connection sensor so that movement of the vehicle is restricted in the event that the parts of the tow hitch system are not attached securely to one another; and

sensing, using a vehicle movement direction sensor, the direction in which the vehicle will move and providing an override signal to the movement restriction module which deactivates the movement restriction module so that the movement restriction module does not restrict movement of the vehicle if the vehicle movement direction sensor senses that the vehicle will move in a direction which is at least partly towards the trailer.