SLIDABLY ADJUSTABLE FIFTH WHEEL HITCH ASSEMBLY FOR A VEHICLE AND CONTROL SYSTEM FOR THE SAME

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ABSTRACT
An automatically adjustable fifth wheel assembly for a vehicle and trailer combination that adjusts the position of the trailer relative to the vehicle is provided.
ARE ALL SENSORS FUNCTIONAL?

IF SPEED > 45mph, 5 MINUTES

IF SPEED < 35mph OR BRAKES ON (THRESHOLD AND TIME GATE)

IS TRAILER YAW RATE/ANGLE > THRESHOLD?

FIG. 11
ACTUATOR IS RETRACTED OR PARTIALLY RETRACTED POSITION. LOCKS ARE ON.

ENERGIZE LOCK RETRACT ACTUATOR

MOVE FORWARD 100ms

MOVE REARWARD

ACTUATOR AT FULL EXTEND?

DROP LOCKS, ACTUATOR VALVE TO MID POSITION

IS ACTUATOR TIMEOUT OK?

FLAG SYSTEM FAILURE

FIG. 12
ACTUATOR IS IN EXTENDED POSITION. LOCKS ARE ON.

ENERGIZE LOCK RETRACT ACTUATOR

MOVE REARWARD 100ms

MOVE FORWARD

GAP <24 in OR LANDING GEAR CAN < X

YES

DROP LOCKS, ACTUATOR VALVE TO MID POSITION

NO

FRONT AXLE LOAD >= 12,000 lbs

YES

DROP LOCKS, ACTUATOR VALVE TO MID POSITION

NO

IS ACTUATOR TIMEOUT OK?

YES

FLAG SYSTEM FAILURE

NO

FIG. 13
SLIDABLY ADJUSTABLE FIFTH WHEEL HITCH ASSEMBLY FOR A VEHICLE AND CONTROL SYSTEM FOR THE SAME

RELATED APPLICATIONS

[0001] The present application claims priority to U.S. Provisional Patent Application No. 61/244,472 filed on Sep. 22, 2009, which is herein incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to a movable fifth wheel assembly for a vehicle and a control system for the same. More particularly, the disclosure relates to a fifth wheel assembly for a vehicle that automatically adjusts the distance between a trailer and the vehicle under certain appropriate operating conditions.

BACKGROUND

[0003] Over the last several years vehicle manufacturers and vehicle operators have worked to improve fuel efficiency of vehicles, so that vehicles may be less expensive to operate and meet more stringent fuel economy regulations. In some heavy-duty vehicles, such as semi trucks, or tractor-trailers, a vehicle is used to pull a trailer that contains cargo, and the location where the trailer connects to the vehicle is often referred to as a fifth wheel. One approach to improving fuel economy involves decreasing the distance between the vehicle and the trailer during certain operating conditions by moving the fifth wheel. Positioning the trailer in closer proximity to the vehicle improves aerodynamics of the vehicle and trailer combination, thus increasing fuel economy of the vehicle. However, in other operating conditions, it may be a disadvantage to position the trailer close to the vehicle, such as during a turn, during rapid deceleration, during low speed operations, or if the trailer is loaded in a manner that positioning the trailer closer to the vehicle would violate axle weight restrictions set by government regulations.

[0004] Therefore, a need exists for a system and method that is capable of automatically positioning a trailer relative to a vehicle by moving a fifth wheel assembly based upon operating conditions of the vehicle and trailer.

SUMMARY

[0005] According to one process, a method, executed by a control system, for automatically moving a fifth wheel actuator of a heavy duty vehicle having a cab between a forward position in which the fifth wheel actuator is in its closest position to the cab and a rearward position in which the fifth wheel actuator is in its farthest position from the cab is provided. A plurality of vehicle parameter sensors are monitored to determine whether at least one of the plurality of parameter sensors is nonfunctional and generate a movement event output signal when at least one of the plurality of parameter sensors is nonfunctional. A vehicle speed is monitored over a predetermined time interval. The monitored vehicle speed is compared to a first speed threshold value and generates a movement event output signal when the vehicle speed exceeds the first predetermined speed threshold value. The monitored vehicle speed is compared to a second speed threshold value and generates a second movement event output signal when the vehicle speed exceeds the second predetermined speed threshold value. A vehicle yaw is determined. The monitored vehicle yaw is compared to a yaw threshold value and generates a second movement event output signal when the vehicle yaw exceeds the yaw threshold value. The fifth wheel actuator automatically moves in response to the first or second generated movement event output signal.

[0006] According to another process, a method, executed by a control system, for automatically moving a fifth wheel actuator of a heavy duty vehicle having a cab between a forward position closest to the cab and a rearward position farthest from the cab is provided. A vehicle speed is monitored over a predetermined time interval. A vehicle acceleration is monitored and generates vehicle acceleration data indicative of the monitored acceleration. At least one of a vehicle steer angle, steer rate, articulation angle and articulation rate is monitored and generates vehicle yaw data indicative of the monitored steer angle, steer rate, articulation angle and articulation rate. A movement event output signal is generated when the vehicle speed data, vehicle acceleration data and vehicle yaw rate data meet predetermined vehicle parameters. The fifth wheel actuator automatically moves in response to the generated movement event output signal.

[0007] According to one embodiment, a system for controlling actuation of a fifth wheel actuator of a vehicle comprises a plurality of sensors, a controller and a fifth wheel actuator. The plurality of sensors are each associated with at least one of the vehicle cab and trailer. The plurality of sensors are provided to gather data indicative of the vehicle speed, vehicle acceleration, vehicle yaw and fifth wheel actuator position. The controller is in communication with the sensors. The controller is provided to evaluate vehicle speed over a predetermined time interval, vehicle acceleration, steer angle, steer rate, articulation angle and articulation rate. The controller is further provided to generate a movement event output signal resulting from the evaluated vehicle speed over a predetermined time interval, vehicle acceleration, steer angle, steer rate, articulation angle and articulation rate. The fifth wheel actuator moves between a forward position in which the fifth wheel actuator is closest to the cab of the vehicle and a rearward position in which the fifth wheel actuator is farthest from the cab of the vehicle. The fifth wheel actuator is responsive to generation of the movement event output signal by the controller.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a perspective view of a vehicle having a slidable adjustable fifth wheel hitch assembly in a first position with an attached trailer;
[0009] FIG. 2 is a perspective view of a vehicle having a movable fifth wheel assembly of FIG. 1 in a second position with an attached trailer;
[0010] FIG. 3 is a detailed perspective view of the fifth wheel assembly of FIG. 1;
[0011] FIG. 4 is a side view of a latch mechanism of an adjustable fifth wheel assembly according to one embodiment;
[0012] FIGS. 5a and 5b are detailed views of an over-center pivot for a latch mechanism;
[0013] FIG. 6 is a side view of a latch pair assembly in a latched position according to one embodiment;
[0014] FIG. 7 is a side view of a latch pair assembly in an unlatched position according to one embodiment;
[0015] FIG. 8 is a side view of a latch pair assembly in an unlatched position according to another embodiment;
DETAILED DESCRIPTION

FIG. 1 shows a vehicle and trailer combination 10 having a vehicle 12 and a trailer 14. The vehicle 12 has a slideably adjustable fifth wheel hitch assembly 16. As shown in FIG. 1, the slideably adjustable fifth wheel hitch assembly 16 is disposed in a first position. In the first position, the trailer 14 is separated from the vehicle 12 by a distance A. The distance A is sufficient to allow the vehicle 12 to turn without contacting the trailer 14.

FIG. 2 shows the vehicle and trailer combination 10 of FIG. 1, with the slideably adjustable fifth wheel hitch assembly 16 disposed in a second position. In the second position, the trailer 14 is separated from the vehicle 12 by a distance B. The distance B is less than the distance A of FIG. 1. In the second position with the trailer 14 closer to the vehicle 12, the aerodynamics of the vehicle and trailer combination 10 is improved. The improved aerodynamics of the vehicle and trailer combination 10 reduce the fuel consumption of the vehicle and trailer combination 10. The distance B between the vehicle 12 and the trailer 14 limit the allowable movement between the vehicle 12 and the trailer 14, such that some turns require that the trailer 14 be moved away from the vehicle 12 to prevent contact between the vehicle 12 and the trailer 14.

FIG. 3 depicts a detailed perspective view of the slideably adjustable fifth wheel hitch assembly 16. The slideably adjustable fifth wheel hitch assembly 16 has a fifth wheel hitch member 18 adapted to receive a pin from the trailer 14 in order to attach the trailer 14 to the vehicle 12. The fifth wheel hitch member 18 has a plurality of latch mechanism assemblies 20b-20d that releasably attach the fifth wheel hitch member 18 to a first rack 22a and a second rack 22b. As shown in FIG. 3, a first latch mechanism assembly 20a and a second latch mechanism assembly 20b releasably attach the fifth wheel hitch member 18 to the first rack 22a, while a third latch mechanism assembly 20c and a fourth latch mechanism assembly 20d releasably attach the fifth wheel hitch member 18 to the second rack 22b.

A fifth wheel actuator, such as a hydraulic cylinder 24, is provided to adjust the slideably adjustable fifth wheel hitch assembly 16 in a direction generally parallel to a longitudinal axis of the vehicle 12. It is additionally contemplated that the fifth wheel actuator may be a pneumatic actuator, an electric motor, an electromagnetic device, a chain driven actuator, a pulley system, or other known actuator types, not just a hydraulic cylinder 24. The hydraulic cylinder 24 moves the slideably adjustable fifth wheel hitch assembly 16 when at least some of the plurality of latch mechanisms 20a-20d are released from the first and second racks 22a, 22b.

The hydraulic cylinder 24 attaches via a cylinder mount assembly 28 to a first frame cross member 30 that connects to a first frame rail 34a and a second frame rail 34b, as is additionally shown in FIG. 10. The cylinder mount assembly 28 is adapted to move laterally along the first frame cross member 30, such that additional torsional stress is not delivered to a first frame rail 34a and a second frame rail 34b of the vehicle 12 by the slideably adjustable fifth wheel hitch assembly 16.

The cylinder mount assembly 28 is constrained from movement in a longitudinal direction relative to the first frame cross member 30 by a first longitudinal support 26a and a second longitudinal support 26b. The first longitudinal support 26a and the second longitudinal support 26b distribute a longitudinal load placed on the cylinder mount assembly 28 to the second frame cross member 32. The first frame cross member 30 connects to the first frame rail 34a and the second frame rail 34b. The second frame cross member 32 additionally connects to the first frame rail 34a and the second frame rail 34b. The first longitudinal support 26a and the second longitudinal support 26b distribute a longitudinal load from the hydraulic cylinder 24 to frame rails 34a, 34b of the vehicle 12, avoiding a concentration of stress along the first frame cross member 30.

Turning now to FIG. 4, the first latch mechanism assembly 20a is shown in greater detail. The second, third and fourth latch mechanism assemblies 20b-20d function similarly to the first latch mechanism 20a. While the first latch mechanism assembly 20a is described in use with the slideably adjustable fifth wheel hitch assembly 16, it is additionally contemplated that the first latch mechanism assembly 20a may be utilized with other systems for moving equipment along an axis.

The first latch mechanism assembly 20a has a latch body 42 and is pivotably coupled to the first rack 22a by a latch mechanism 44. A locking tooth portion 43 that internests with a plurality of rack teeth 48. A locking space 50 is formed between each of the rack teeth 48, such that the latching tooth portion 43 is disposed within the locking space 50 when the latch mechanism 20a is engaged. The latching portion 43 of the latch body 42 is disposed at a first end of the latch body 42.

The latching portion 43 of the latch body 42 additionally has a crank opening 45 formed within the latch body 42. The crank opening 45 is disposed at a second end of the latch body 42. An over-center pivot 36 is disposed within the crank opening 45 of the latch body 42. The latch body 42 is adapted to pivot about the over-center pivot 36. The over-center pivot 36 comprises a crank portion 36a and a ground portion 36b. The crank portion 36a pivots about the ground portion 36b to allow the latch body 42 to pivot about the over-center pivot 36.

As shown in FIG. 5a and FIG. 5b, the crank portion 36a rotates in the direction of arrow A about the ground portion 36b in order to lock the over-center pivot 36 and prevent the latch body 42 from pivoting about the over-center pivot 36. However, when the crank portion 36a has pivoted about the ground portion 36b as shown in FIG. 5b, the latch body 42 may rotate about the over-center pivot 36.
[0032] Turning to FIG. 4 and FIGS. 6-8, a roller actuator assembly 44 is disposed the first end of the latch body 42. The roller actuator assembly 44 has a wheel 47. The wheel 47 is sized to be partially disposed within the locking space 50. The roller actuator assembly 44 is hydraulically operated to position the roller actuator assembly 44 between an extended position, as shown in FIG. 7, and a retracted position, as shown in FIG. 6. The movement of the roller actuator assembly 44 to the extended position causes the crank portion 36a to rotate about the ground portion 36b of the over-center pivot 36 to allow the latch body 42 to rotate about the over-center pivot 36. Once the roller actuator assembly 44 is in the extended position, the latching tooth portion 43 of the latch mechanism 20a-20d is removed from the locking space 50, and the slidable adjustable fifth wheel hitch assembly 16 may be moved longitudinally.

[0033] As the roller actuator assembly 44 is extended, the latching tooth portion 43 moves up and out of the locking space 50 as the latch body 42 pivots about the over-center pivot 36. The roller actuator assembly 44 is disposed in the locking space 50 adjacent the locking space 50 containing latching tooth portion 43. The latch mechanism 20a-20d may be moved longitudinally.

[0034] As shown in FIGS. 6-8, the third latch mechanism assembly 20c and the fourth latch mechanism assembly 20d are shown forming a latch pair assembly 120. As shown in FIG. 6, the roller actuator assembly 44d of the fourth latch mechanism assembly 20d and the roller actuator assembly 44c of the third latch mechanism assembly 20c are in the retracted position.

[0035] As shown in FIG. 7, the roller actuator assembly 44d of the fourth latch mechanism assembly 20d and the roller actuator assembly 44c of the third latch mechanism assembly 20c are in the extended position. Once the roller actuator 44d of the fourth latch mechanism assembly 20d is in the extended position, the latch pair assembly 120 may be moved in the direction of arrow B.

[0036] As shown in FIG. 8, the roller actuator assembly 44d of the fourth latch mechanism assembly 20d is in the extended position, while the roller actuator assembly 44c of the third latch mechanism assembly 20c is in the retracted position. Similarly, once the roller actuator 44d of the fourth latch mechanism assembly 20d is in the extended position, the latch pair assembly 120 may be moved in the direction of arrow B.

[0037] As shown in FIGS. 7 and 8, only the roller actuator assembly 44d of the fourth latch mechanism assembly 20d is required to be placed into the extended position to allow the latch pair assembly 120 to move in the direction of arrow B. Conversely, only the roller actuator assembly 44c of the third latch mechanism assembly 20c is required to be placed into the extended position to allow the latch pair assembly 120 to move in an opposite direction of arrow B. This is because the shape of the rack teeth 48 form a generally concave surface, such that latching tooth portion 43 of the latch mechanism assemblies 20a-20d may come out of the locking space 50 in one longitudinal direction, but will remain within the locking space in the other longitudinal direction. Therefore, the use of a latch pair assembly 120 prevents movement of the slidable adjustable fifth wheel hitch assembly 16 in a longitudinal direction unless at least one of the roller actuator assemblies 44c, 44d is in the extended position.

[0038] Turning back to FIG. 4, the first latch mechanism assembly 20a additionally comprises a latch valve assembly that comprises a hydraulic valve 37a disposed at the second end of the latch body 42 that is connected to a cam follower 40 that follows a cam surface 38. The hydraulic valve 37a has an open position and a closed position. The hydraulic valve 37a controls flow of hydraulic fluid to the roller actuator assembly 44. As the cam follower 40 moves along the cam surface 38, the hydraulic valve 37a closes, cutting off the flow of hydraulic fluid to the roller actuator assembly 44. As the roller actuator assembly 44 reaches the next locking space 50, the latching tooth portion 43 of the latch body 42 is returned to an adjacent locking space 50 to prevent additional movement of the slidable adjustable fifth wheel hitch assembly 16, unless the roller actuator assembly 44 is reactivated. In this way, the hydraulic valve 37a acts as a safety mechanism to secure the latching tooth portion 43 into a locking space 50 should a hydraulic failure occur, as a biasing member 46 is adapted to rotate the latch body 42 about the over-center pivot 36 so that the latching tooth portion 43 enters the locking space 50. As shown in FIG. 9, a hydraulic passageway 144 connects the hydraulic valve 37a with the roller actuator assembly 44, such that the closing of the hydraulic valve 37a deactivates the roller actuator assembly 44.

[0039] A biasing member 46 is provided to bias the latch mechanism assembly 20a towards a latched position. As shown, the biasing member 46 is a spring, however, it is contemplated that an elastomeric biasing member may be utilized. Should a hydraulic failure occur with the roller 44 extended, the biasing member 46 will bias the latch mechanism assembly 20a towards an engaged position, such that the latching tooth portion 43 will reenter a locking space 50, securing the latch mechanism 20a.

[0040] FIG. 14 shows an electrical and control system 300 for a vehicle having a slidable adjustable fifth wheel hitch assembly 16 according to one embodiment. The electrical and control system comprises a controller 302 that is in communication with a plurality of sensors to monitor and control operation of the slidable adjustable fifth wheel hitch assembly 16. The controller 302 is additionally in communication with a display 304 and a power control unit 306 that supplies power to the electrical and control system 300. A steering sensor 308 is provided to monitor a steering rate of the vehicle. A wheel angle sensor 310 is provided to monitor the steering angle of the vehicle.

[0041] A first rear cab sensor 312 and a second rear cab sensor 314 are additionally provided. The first rear cab sensor 312 and the second rear cab sensor 314 determine a distance between a vehicle and a trailer, such as the distance between the rear of a vehicle cab and a front surface of the trailer. The controller 302 may additionally utilize a difference in the distance between the vehicle and the trailer indicated by the first rear cab sensor 312 and the second rear cab sensor 314 to determine an articulation angle of the trailer relative to the truck as well as a yaw rate of the trailer.

[0042] A plurality of sensors are provided near the slidable adjustable fifth wheel hitch assembly 16 including a first
slidably adjustable fifth wheel hitch assembly position and status sensor 316 and a second slidably adjustable fifth wheel hitch assembly position and status sensor 318. The first fifth wheel hitch assembly position and status sensor 316 monitors whether a first pair of latch mechanisms are in a latched or released state and monitors the longitudinal position of the fifth wheel hitch assembly 16. Similarly, the second fifth wheel hitch assembly position and status sensor 318 monitors whether a second pair of latch mechanisms are in a latched or released state and monitors the longitudinal position of the fifth wheel hitch assembly. The controller 302 thus may control an actuator, such as a hydraulic cylinder, to move the slidably adjustable fifth wheel hitch assembly 16.

[0043] A first axle load sensor 324 and a second axle load sensor 326 are additionally provided. The first axle load sensor 324 monitors a load on a first rear axle of the vehicle, while the second axle load sensor 326 monitors a load on a second rear axle of the vehicle. The controller 302 monitors the load on the first rear axle and the second rear axle to ensure that the vehicle does not exceed an axle weight limit in place where the vehicle is operating.

[0044] A first rear vehicle sensor 320 and a second rear vehicle sensor 322 are additionally provided. The first rear vehicle sensor 320 and the second rear vehicle sensor 322 additionally determine a distance between the vehicle and the trailer, such as the distance between the rear of the vehicle and an undercarriage of the trailer. The controller 302 may additionally utilize a difference in the distance between the vehicle and the trailer indicated by the first rear vehicle sensor 320 and the second rear vehicle sensor 322 to determine an articulation angle of the trailer relative to the truck as well as a yaw rate of the trailer. The articulation angle and yaw rate based upon the rear vehicle sensors 320, 322 may be compared by the controller 302 to the articulation angle and the yaw rate based upon the rear cab sensors 312, 314 to serve as a additionally parameter the controller utilizes to control the actuator to move the slidably adjustable fifth wheel hitch assembly 16.

[0045] While sensors determining the distance between the vehicle and the trailer have been described as being disposed on the vehicle, it is additionally contemplated that sensors may be located on the trailer to determine the distance between the vehicle and the trailer and the articulation angle and yaw rates of the trailer. It is further contemplated that sensors may be found on both the vehicle and the trailer to determine the distance between the vehicle and the trailer and the articulation angle and yaw rates of the trailer.

[0046] Turning now to FIG. 11, a method 200 of controlling a slidably adjustable fifth wheel hitch assembly 16 is depicted. As shown at block 202, the method determines if all sensors are functioning. A decision block 204 directs the slidably adjustable fifth wheel hitch assembly 16 to a push back position block 206, i.e., away from a vehicle front, if not all of the sensors are functioning. However, if all sensors are functioning, the method progresses to block 208 to determine if the vehicle speed is more than a first predetermined speed and has been for a first preset time period, such as 45 miles per hour for a 5 minute time period. A decision block 210 directs the slidably adjustable fifth wheel hitch assembly to a pull forward position block 212, i.e., towards a vehicle front, if the vehicle is traveling at a speed above the first predetermined speed for the first preset time period. If the vehicle speed does not satisfy the first predetermined conditions, the decision block 210 moves the method to block 214, where it is determined if the vehicle speed is below a second predetermined speed for a second preset time period, or if the brakes are being applied. A decision block 216 determines if the conditions of the second predetermined speed and preset time period are met, or if the vehicle’s brakes are being applied, the method again enters the push back position block 206. However, if the decision block 216 does not meet the conditions of block 214, the method determines if trailer movement exceeds preset ranges 218. At decision block 220, push back block 206 is selected if the trailer movement exceeds preset ranges, while the method returns to block 202 if the trailer movement does not exceed preset ranges.

[0047] Turning now to FIG. 12, push back position block 206 is shown. The method 206 confirms that the slidably adjustable fifth wheel hitch assembly 16 is in at least a partially retracted position at block 222. The method unlatches the latch mechanisms 20a-20d at block 224. The method moves the slidably adjustable fifth wheel hitch assembly forward for a short predetermined period of time at block 226. The method then moves the slidably adjustable fifth wheel hitch assembly 16 backward at block 228. At block 230, the method determines if the slidably adjustable fifth wheel hitch assembly 16 is at a fully extended position. A decision block 232 reengages the latch mechanisms 20a-20d if the slidably adjustable fifth wheel hitch assembly 16 is fully extended. If the slidably adjustable fifth wheel hitch assembly 16 is not fully extended, the method determines if a predetermined period of time has been exceeded during the movement of slidably adjustable fifth wheel hitch assembly 16. A decision block 240 generates an error condition at block 238 if the predetermined period of time has been exceeded, or returns to block 228 to continue moving the slidably adjustable fifth wheel hitch assembly backward.

[0048] Turning to FIG. 13, pull forward position block 212 is depicted. The method 212 confirms that the slidably adjustable fifth wheel hitch assembly 16 is in an extended position at block 242. The method unlatches the latch mechanisms 20a-20d at block 244. The method moves the slidably adjustable fifth wheel hitch assembly 16 backward for a short predetermined time at block 246. The method then moves the slidably adjustable fifth wheel hitch assembly 16 forward at block 248. The method determines if the trailer is within a predetermined distance of the cab at block 250. A decision block 252 reengages the latch mechanisms 20a-20d if the trailer is within the predetermined distance of the cab. If the trailer is not within the predetermined distance of the cab, the method determines if an axial load of the vehicle exceeds a predetermined threshold at block 256. A decision block 258 reengages the latch mechanisms 20a-20d if the axial load of the vehicle exceeds the predetermined threshold. If the axial load of the vehicle does not exceed the predetermined threshold, the method determines if a predetermined period of time has been exceeded at block 262. A decision block 264 generates an error condition at block 266 if the predetermined period of time has been exceeded, or returns to block 248.

[0049] It will be understood that a control system may be implemented in hardware to effectuate the method. The control system can be implemented with any or a combination of the following technologies, which are each well known in the art: a discrete logic circuit(s) having logic gates for implementing logic functions upon data signals, an application specific integrated circuit (ASIC) having appropriate combinational logic gates, a programmable gate array(s) (PGA), a field programmable gate array (FPGA), etc.
When the control system is implemented in software, it should be noted that the control system can be stored on any computer readable medium for use by or in connection with any computer related system or method. In the context of this document, a “computer-readable medium” can be any medium that can store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device. The computer readable medium can be, for example, but is not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, device, or propagation medium. More specific examples (a non-exhaustive list) of the computer-readable medium would include the following: an electrical connection (electronic) having one or more wires, a portable computer diskette (magnetic), a random access memory (RAM) (electronic), a read-only memory (ROM) (electronic), an erasable programmable read-only memory (EPROM, EEPROM, or Flash memory) (electronic), an optical fiber (optical), and a portable compact disc read-only memory (CDROM) (optical). The control system can be embodied in any computer-readable medium for use by or in connection with an instruction execution system, apparatus, or device, such as a computer-based system, processor-containing system, or other system that can fetch the instructions from the instruction execution system, apparatus, or device and execute the instructions.

What is claimed is:

1. A method, executed by a control system, for automatically moving a fifth wheel actuator of a heavy duty vehicle having a cab between a forward position in which the fifth wheel actuator is in its closest position to the cab and a rearward position in which the fifth wheel actuator is in its farthest position from the cab, the method comprising:
   monitoring a plurality of vehicle parameter sensors to determine whether at least one of the plurality of parameter sensors is nonfunctional and generating a movement event output signal when at least one of the plurality of parameter sensors is nonfunctional;
   monitoring a vehicle speed over a predetermined time interval;
   comparing the monitored vehicle speed to a first speed threshold value and generating a movement event output signal when the vehicle speed exceeds the first predetermined speed threshold value;
   comparing the monitored vehicle speed to a second speed threshold value and generating a first movement event output signal when the vehicle speed is below the second predetermined speed threshold value;
   determining a vehicle yaw;
   comparing the monitored vehicle yaw to a yaw threshold value and generating a second movement event output signal when the vehicle yaw exceeds the yaw threshold value; and
   automatically moving the fifth wheel actuator in response to the first or second generated movement event output signal.

2. The method of claim 1, wherein the fifth wheel assembly is moved toward its rearward position in response to generation of a movement event output signal when at least one of the plurality of sensors is nonfunctional.

3. The method of claim 1, wherein the fifth wheel assembly is moved toward its rearward position in response to generation of a movement event output signal when the vehicle speed is below the second speed threshold value.

4. The method of claim 1, wherein the fifth wheel assembly is moved toward its rearward position in response to generation of a movement event output signal when the trailer yaw exceeds the first yaw threshold value.

5. The method of claim 1, wherein the yaw threshold value is based on at least one of a threshold steer rate, a threshold steer angle, a threshold articulation rate, and a threshold articulation angle.

6. The method of claim 1, further comprising:
   determining the position of the fifth wheel actuator; and
   generating a third movement event output signal when the fifth wheel actuator is in its rearward position.

7. A method, executed by a control system, for automatically moving a fifth wheel actuator of a heavy duty vehicle having a cab between a forward position closest to the cab and a rearward position farthest from the cab, the method comprising:
   monitoring a vehicle speed over a predetermined time interval and generating vehicle speed data indicative of the monitored vehicle speed over the predetermined time interval;
   monitoring a vehicle acceleration and generating vehicle acceleration data indicative of the monitored acceleration;
   monitoring at least one of a vehicle steer angle, steer rate, articulation angle and articulation rate and generating vehicle yaw data indicative of the monitored vehicle steer angle, steer rate, articulation angle and articulation rate;
   generating a movement event output signal when the vehicle speed data, vehicle acceleration data and vehicle yaw rate data meet predetermined vehicle parameters; and
   automatically moving the fifth wheel actuator in response to the generated movement event output signal.

8. The method of claim 7, wherein the fifth wheel actuator is automatically moved toward its forward position in response to generation of a movement event output signal when the vehicle speed exceeds a predetermined speed threshold over the predetermined time interval, the yaw rate is less than a predetermined yaw threshold value, the vehicle acceleration is less than a predetermined acceleration threshold value and the fifth wheel actuator is in its rearward position.

9. The method of claim 7, wherein the fifth wheel actuator is automatically moved toward its rearward position in response to generation of a movement event output signal when the vehicle speed is less than a predetermined speed threshold.

10. The method of claim 7, wherein the fifth wheel actuator is automatically moved toward its rearward position in response to generation of a movement event output signal when the yaw rate exceeds a predetermined yaw threshold value.

11. The method of claim 7, wherein the fifth wheel actuator is automatically moved toward its rearward position in response to generation of a movement event output signal when vehicle acceleration exceeds a predetermined acceleration threshold value.

12. The method of claim 7, further comprising monitoring the plurality of sensors to determine whether at least one of the plurality of sensors is nonfunctional and generating a movement event output signal when at least one of the plurality of sensors is nonfunctional, wherein the fifth wheel
actuator is automatically moved toward its rearward position in response to generation of a movement event output signal when at least one of the plurality of sensors is nonfunctional.

14. The method of claim 7, wherein the fifth wheel actuator is prevented from moving toward its rearward position when the vehicle speed is less than a predetermined speed threshold.

15. The method of claim 7, wherein at least one of the predetermined vehicle parameters is a predetermined speed threshold value of 45 mph over a time interval of 5 minutes, and wherein the fifth wheel assembly is moved toward its forward position in response to generation of a movement event output signal when the vehicle speed is less than 45 mph for a time interval of greater than 5 minutes.

16. The method of claim 7, wherein at least one of the predetermined vehicle parameters is a threshold steer angle value of approximately 30 degrees and a threshold steer rate value of approximately 30 degrees per second, and wherein the fifth wheel assembly is moved toward its rearward position in response to generation of a movement event output signal when one of either the threshold steer angle value is greater than approximately 30 degrees and the threshold steer rate value is greater than approximately 30 degrees per second.

17. The method of claim 7, wherein at least two of the predetermined vehicle parameters is a threshold articulation angle value of approximately 10 degrees and a threshold articulation rate value of approximately 10 degrees per second, and wherein the fifth wheel assembly is moved toward its rearward position in response to generation of a movement event output signal when one of either the threshold articulation angle value is greater than approximately 10 degrees and the threshold articulation rate value is greater than approximately 10 degrees per second.

18. A system for controlling actuation of a fifth wheel actuator of a vehicle, the system comprising:
   a plurality of sensors each associated with at least one of the vehicle cab and trailer, the plurality of sensors provided to gather data indicative of the vehicle speed, vehicle acceleration, vehicle yaw and fifth wheel actuator position;
   a controller in communication with the sensors, the controller being provided to evaluate vehicle speed over a predetermined time interval, vehicle acceleration, steer angle, steer rate, articulation angle and articulation rate, the controller further being provided to generate a movement event output signal resulting from the evaluated vehicle speed over a predetermined time interval, vehicle acceleration, steer angle, steer rate, articulation angle and articulation rate; and
   a fifth wheel actuator movable between a forward position in which the fifth wheel actuator is closest to the cab of the vehicle and a rearward position in which the fifth wheel actuator is farthest from the cab of the vehicle, the fifth wheel actuator being responsive to generation of the movement event output signal by the controller.

19. The system of claim 18, wherein a movement event output signal is generated when the vehicle speed exceeds a predetermined speed threshold over the predetermined time interval, the yaw rate is less than a predetermined yaw threshold value, the vehicle acceleration is less than a predetermined acceleration threshold value, and the fifth wheel actuator is in its rearward position.

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