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EP 3409088 A1 **US 20120242473 A1**
US 20110006892 A1 **US 20070124070 A1**
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(58) Field of Search:
 INT CL **B60K, B60R, B62D, G01C, H04N**
 Other: **WPI, EPODOC, Patent Fulltext**

(54) Title of the Invention: **Method of displaying information and a display system**
 Abstract Title: **Vehicle information display method and system**

(57) A method (100 fig 1) of displaying information for a vehicle comprises receiving, from a control device, a selection to display information on a display device 210 of the vehicle in a first display mode or a second display mode. The method (100) further comprises obtaining vehicle movement data and displaying information on the display device according to the selected display mode. In the first display mode, the information is displayed regardless of vehicle movement, and in the second display mode, the information is displayed upon satisfying a vehicle movement condition based on the vehicle movement data. A display system 200 is provided for essentially performing the method and may be suitable for use on a motorcycle and may include a mobile device 300 such as a personal digital assistant. A displayed touch button 220 may be provided to allow a user to select the mode for a display device 210. The invention addresses issues such as a large amount of information displayed possibly leading to distraction.

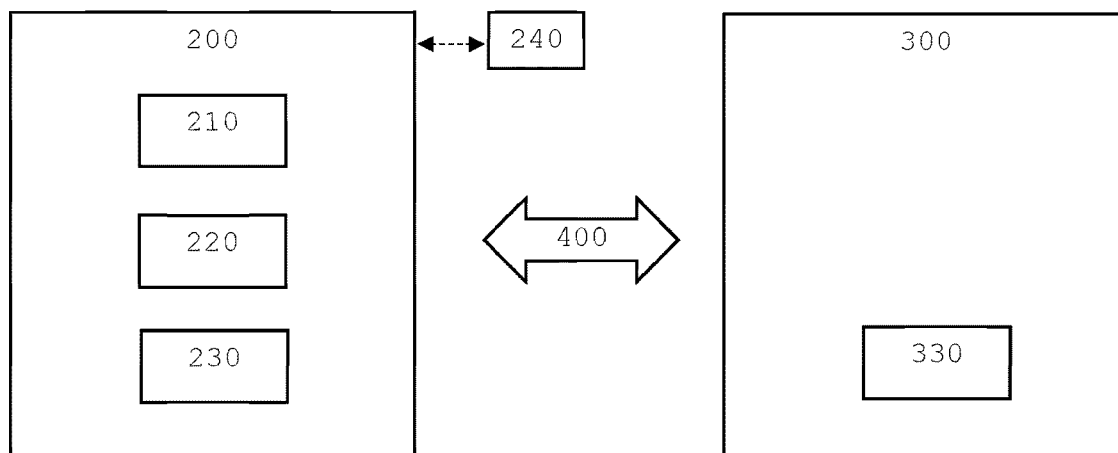


Fig. 3

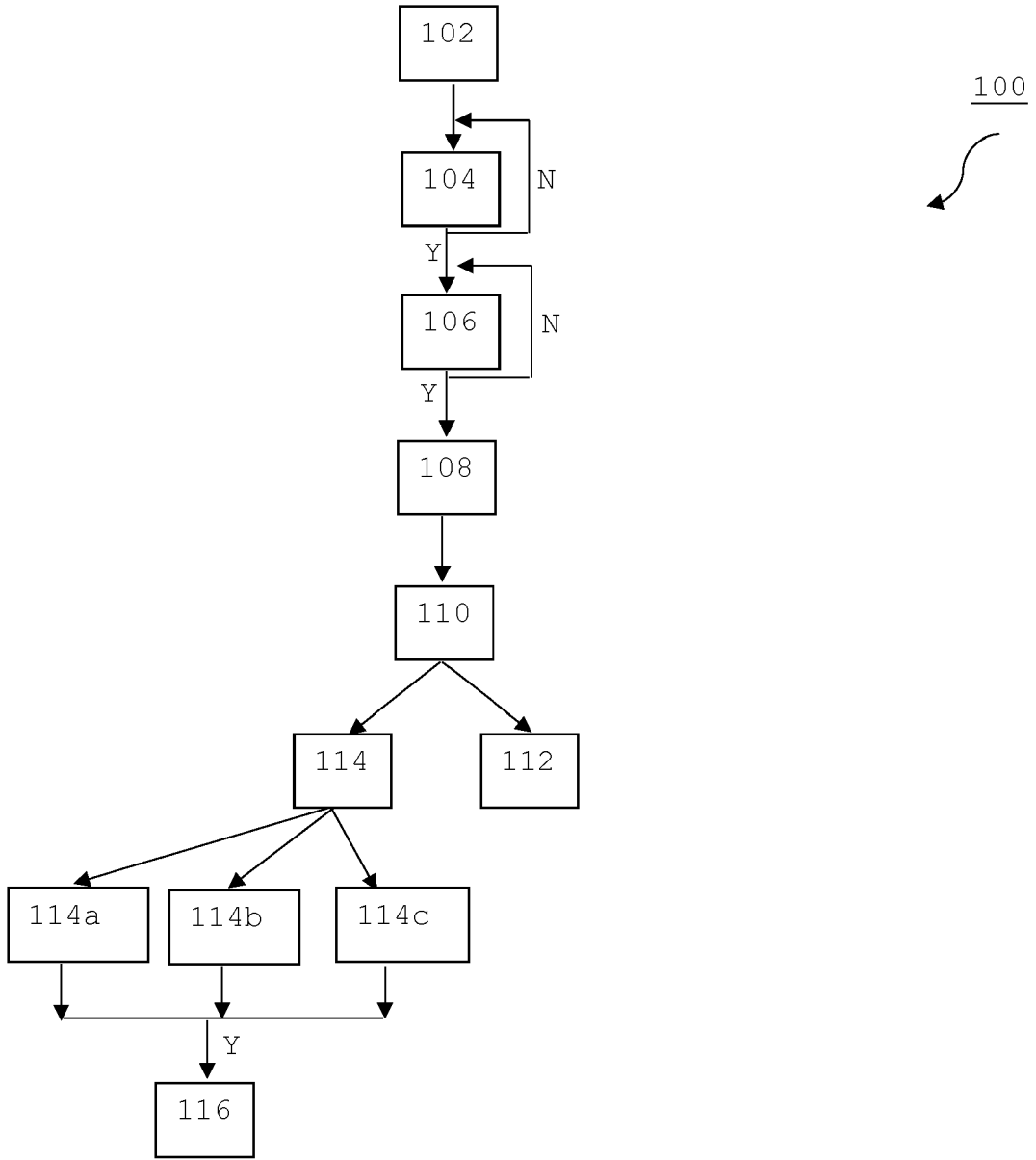


Fig. 1

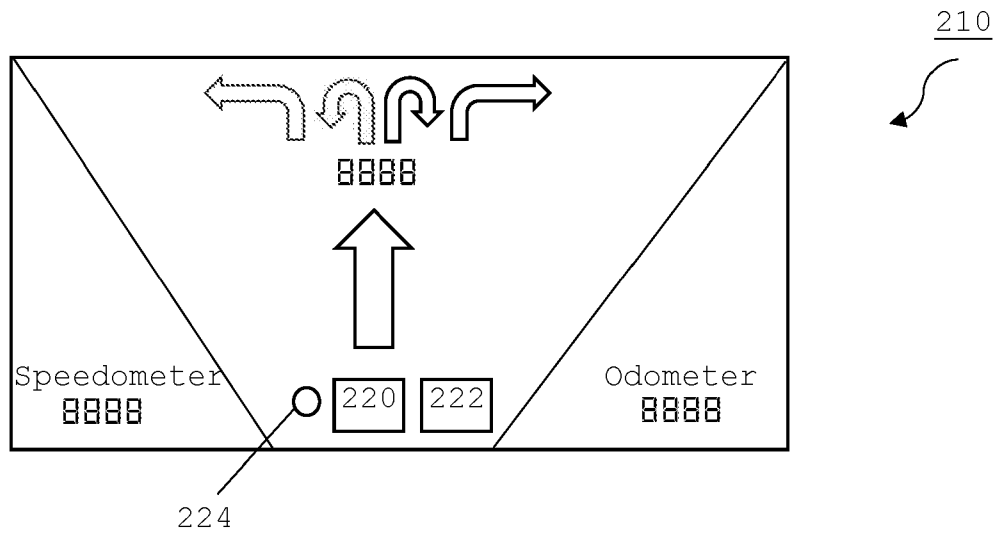


Fig. 2

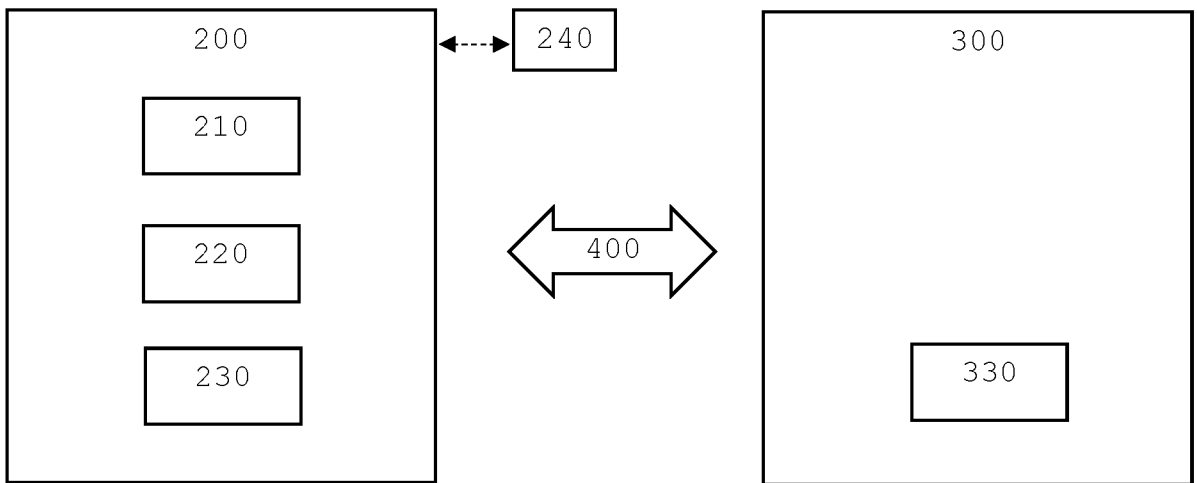


Fig. 3

Method of Displaying Information and a Display System

Field of Invention

[001] This invention relates to display systems in a vehicle and
5 methods of displaying information in a vehicle.

Background of Invention

[002] The amount of information presented to vehicle operators
is ever increasing. Not only does this trend lead to a longer lead
10 time to read and identify the information desired, there are
safety concerns as the operator may become distracted.

[003] In addition, personal devices used by the operator or
those that are connected to the vehicle's display or other systems
15 may contribute to operator distraction.

[004] Existing solutions to mitigate operator distraction
include modifying the presentation of information when the
vehicle operator is driving. However, such solutions increase
20 cost and complexity of the vehicle.

[005] There is therefore a need to provide a vehicle display that
overcomes or at least ameliorates one or more of the disadvantages
discussed above.

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Summary

[006] It is therefore an object to provide a method of displaying
information for a vehicle and a vehicle display system to address
the problems discussed above.

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[007] To accomplish this and other objects, there is provided,
in an aspect, a method of displaying information for a vehicle,
the method comprising: receiving, from a control device, a
selection to display information on a display device of the

vehicle in a first display mode or a second display mode; obtaining vehicle movement data; displaying information on the display device according to the selected display mode; wherein in the first display mode, the information is displayed re-
5 regardless of vehicle movement, and in the second display mode, the information is displayed upon satisfying a vehicle movement condition based on the vehicle movement data.

[008] In another aspect, there is provided a display system for
10 a vehicle, the system comprising: a display device; a control device configured to receive a selection to display information on the display device in a first display mode or a second display mode; wherein the display device is configured to display information according to the selected display mode, wherein in
15 the first display mode, the information is displayed regardless of vehicle movement, and in the second display mode, the information is displayed upon satisfying a vehicle movement condition based on vehicle movement data received by the display device.

20 [009] Advantageously, an operator or driver of the vehicle may choose the mode of display of information as desired. The prior solutions do not provide such customization to each individual.

25 [010] The second display mode allows information to be displayed only in certain scenarios, that is, upon satisfying a vehicle movement condition. Vehicle movement is a possible indication that the driver is engaged with an activity, i.e. moving the vehicle, other than referring to information. Correlating the
30 display of information with vehicle movement may therefore advantageously enhance safety. An increased level of vehicle movement may indicate a higher level of engagement of the driver with moving the vehicle. Displaying information on the display device may be undertaken only upon detection of a decreased level

of vehicle movement and/or an absence of vehicle movement. In the second display mode, the information may be displayed upon detection of a decreased level of vehicle movement including an absence of vehicle movement. In the second display mode, the information may be displayed upon detection of an absence of vehicle movement.

[011] The first display mode allows information to be displayed at all times, regardless of vehicle movement. An individual who prefers to view information constantly may choose to select the first display mode.

[012] Information displayed in a vehicle include information viewed by the driver. Information displayed in a vehicle may include typical information displayed on an instrument cluster, such as information related to operation of the vehicle, vehicle movement information, fuel or battery information, information on the state of the vehicle engine or motor, information on gearshift or drive mode, and other similar information. Information displayed in a vehicle may include infotainment information, navigation information, telephone and telematics information, and other such information. Information displayed in a vehicle may include information received from a mobile device or a personal user device communicatively coupled to the vehicle or a system of the vehicle, such as the display device or the display system.

[013] In some embodiments, the first or second display modes may be automatically selected depending on the type of information displayed. In such embodiments, the disclosed display modes may control all types of information displayed in the vehicle. The vehicle or a system of the vehicle, such as the display system, may be configured to automatically provide the control device the selection to display information in a display mode. One of the

display modes may be automatically selected by default, depending on the design. The information to be displayed in the first display mode or the second display mode may be predetermined and configured into the vehicle or vehicle system. Information that is required to be displayed at all times may be predetermined to be displayed in the first display mode. For example, information related to operating the vehicle may be displayed according to the first display mode, as the driver may need to refer to such information at any time, regardless of vehicle movement. Information that may be needed to be displayed only upon detection of vehicle movement, or information that should be displayed only upon detection of a decreased level of vehicle movement and/or an absence of vehicle movement, may be predetermined to be displayed in the second display mode. Alternatively, information required to be displayed at all times may be excluded or may not be controlled by the disclosed display modes.

[014] In some or additional embodiments, the disclosed display modes may control some types of information displayed in the vehicle. For example, the disclosed display modes may control display of information that is not required to be displayed at all times. In another example, the disclosed display modes may control display of information that may be needed to be displayed only upon detection of vehicle movement, or information that should be displayed only upon detection of a decreased level of vehicle movement and/or an absence of vehicle movement.

[015] Information received from a mobile device or a personal user device that is communicatively coupled to the vehicle or vehicle system may be a specific embodiment of information that can be controlled by the disclosed display modes. Mobile devices or personal user devices, such as personal digital assistants, mobile phones, tablet computers or portable navigation systems, may be connected by a communication protocol to the vehicle or

vehicle system. The mobile device or personal user device may be connected by wire or wirelessly to the vehicle or vehicle system. The communication protocol may be wired communication protocols such as USB or wireless communication protocols such as Bluetooth or Wi-Fi. Connected devices often supplement the vehicle with additional functions, such as telephone functions, media functions or navigation functions. The functions of the connected device typically utilize vehicle systems, such as the display system or speaker system of the vehicle. As the functions of the connected device are typically optional to the operation of the vehicle, it may be prudent to display information received from the connected device when a decrease in vehicle movement below a threshold is satisfied.

[016] Navigation information is another specific embodiment of information that may be controlled by the disclosed display modes. The first and second display modes may control the display of navigation information. When a vehicle manoeuvre is required according to turn-by-turn instructions of a navigation application or system, movement of the vehicle, like speed and acceleration, is typically decreased in order to perform the manoeuvre. At this point, it may be useful to display navigation information for the driver to refer to in order to perform the manoeuvre. Hence, when the second display mode is selected, the navigation information may be displayed when a decrease in vehicle movement below a threshold is satisfied. On the other hand, it may be useful to display navigation information all the time when a driver is navigating in an unfamiliar area. Hence, the first display mode may be selected to enable the navigation information to be displayed at all times, regardless of vehicle movement. In another example, navigation information may include the next vehicle manoeuvre as well as future, upcoming vehicle manoeuvres. The next vehicle manoeuvre may be automatically

displayed in the first display mode, while the future manoeuvres may be selectable in the first or second display modes.

[017] In some or additional embodiments, the types of information that may be controlled by the disclosed display modes may be dependent on the type of vehicle. It may be more unsafe for a smaller, lighter vehicle, such as a motorcycle, to have the same range of functions during vehicle operation as a larger vehicle, such as a car. Hence, it may be more important to reduce the extent of driver distraction for such smaller, lighter vehicles compared to that of larger vehicles. In a specific embodiment, the vehicle is a two-wheeler. The present disclosure may be advantageous for displaying navigation information on a display device of a two-wheeler. The disclosed display modes may control navigation information displayed on a display device of a two-wheeler.

[018] In some or additional embodiments, the types of information that may be controlled by the disclosed display modes may be dependent on the display device of the vehicle. The disclosed display modes may control information displayed on display devices configured to display information that may potentially block a driver's view of the road. For example, the display device may be a head up display, a display projected on a windshield, or a display projected on a helmet worn by a vehicle user. The disclosed display modes may control information displayed on an instrument cluster, a secondary display or a display of a connected device. In a specific embodiment, the display device is an instrument cluster display. In another specific embodiment, the display device is an instrument cluster display or a speedometer display of a two-wheeler.

[019] Information is displayed, according to the second display mode, upon satisfying a vehicle movement condition. The vehicle

movement condition may be a decreased level of vehicle movement or a level of vehicle movement that goes below a threshold. Alternatively, or additionally, the vehicle movement condition may be an absence of vehicle movement. A decreased level of vehicle movement may include a decrease in speed, a decrease in acceleration, or an increase in deceleration. A decreased level of vehicle movement may be detected by the application of brakes. In some embodiments, it may be useful to display information only upon an absence of vehicle movement, such as when the vehicle speed is zero. In some embodiments, the vehicle movement condition may comprise at least one of dropping below a speed threshold, dropping below an acceleration threshold, or applying brakes. In an embodiment, the vehicle movement condition may be the vehicle speed dropping below a speed threshold. In another embodiment, the vehicle movement condition may be the vehicle speed dropping below a speed threshold and acceleration of the vehicle is zero or negative. The vehicle movement condition or combinations of conditions are not particularly limited and may depend on the vehicle or the design. The thresholds are not particularly limited and may depend on the vehicle or the design. The vehicle movement data obtained may therefore be at least one of speed, acceleration, or braking. Vehicle movement may be obtained from any suitable measurement or detection device that is available in the vehicle or coupled with the vehicle to implement the present disclosure. The measurement or data may be transmitted to the display system or display device for determination whether the vehicle movement condition has been satisfied. For example, speed may be measured by the speedometer of the vehicle and the speed data may be transmitted to the display device for determination whether the vehicle movement condition has been satisfied.

[020] In some embodiments, the selection of the desired display mode may be made through an input device. The control device may

be an input device. The input device may receive the selection of the desired display mode. The control or input device may receive input from a user, such as the driver, to select the desired display mode. The selection may be made by actuating a button or dial or switch. Where the display device is a human machine interface, such as a touchscreen display, the selection may be made by touching a virtual button displayed on the display device. Upon receiving the selection of the desired display mode, the control or input device may cause the vehicle or vehicle system, such as the display system, to control the display of information on the display device. The vehicle system may instruct a presentation layer of the system, such as a display server, and/or other components of the system in order to output or not output the information to be displayed on the display device. As a result, the vehicle system may display information on the display device according to the selected display mode. The actions of the vehicle or vehicle system described herein may be configured by a set of instructions stored in its memory. The instructions may be part of an application layer of the system. The instructions may be executed by a processor of the vehicle system.

[021] In other embodiments, as mentioned above, the selection of the desired display mode may be automatically made by the vehicle or vehicle system and received by the control device. The selection of the desired display mode may be configured by a set of instructions stored in memory of the vehicle or vehicle system, such as the display system. Instructions may be executed by a processor of the vehicle system. The desired display mode may be selected according to the instructions. In such embodiments, the control device may be a set of instructions stored in the memory of the vehicle or vehicle system. The control device may be configured to receive the selection and control the display of information on the display device. The control device may

instruct a presentation layer of the system, such as a display server, and/or other components of the system in order to output or not output the information to be displayed on the display device. The actions of the vehicle system or control device
5 described herein may be configured by instructions stored in memory of the system. The instructions may be part of an application layer of the system.

[022] The vehicle system disclosed herein, e.g. the display
10 system, may be an electronic control unit of the vehicle. The display system may be any control unit comprising a display device. The display system may be an instrument cluster ECU comprising a speedometer display. The display system may be an ECU in the central stack, such as an infotainment and/or
15 navigation system. The display system may be an integrated cluster and infotainment ECU. The display system may be a head up display ECU. Vehicle systems may be computing devices comprising processor(s), such as central processing units, graphics processors and image processors, and computer-readable
20 storage media or memory. The disclosed display system may be configured to execute the disclosed method. The disclosed method may be computer-readable instructions stored in non-transitory memory of the disclosed display system, executable by a processor of the system.

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Brief Description of Drawings

[023] Fig. 1 shows an illustration of a flowchart of a method
100 of displaying information for a motorcycle, according to an embodiment of the invention.

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[024] Fig. 2 shows an illustration of a display device 210 of a motorcycle, according to an embodiment of the invention.

[025] Fig. 3 shows an illustration of a display system 200 for a motorcycle, according to an embodiment of the invention.

[026] In the figures, like numerals denote like parts.

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Detailed Description

[027] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. The detailed description of this invention will be provided for the purpose of explaining the principles of the invention and its practical application, thereby enabling a person skilled in the art to understand the invention for various exemplary embodiments and with various modifications as are suited to the particular use contemplated. 10
The detailed description is not intended to be exhaustive or to limit the invention to the precise embodiments disclosed. Modifications and equivalents will be apparent to practitioners skilled in this art and are encompassed within the spirit and scope of the appended claims. 15

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[028] In embodiments, there is provided a method of displaying information for a vehicle. The method comprises: receiving, from a control device, a selection to display information on a display device of the vehicle in a first display mode or a second display mode; obtaining vehicle movement data; and displaying information on the display device according to the selected display mode. In the first display mode, the information is displayed regardless of vehicle movement. In the second display mode, the information is displayed upon satisfying a vehicle movement condition based on the vehicle movement data. 25
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[029] Fig. 1 illustrates a flowchart of a method 100 of displaying information for a motorcycle, according to an em-

bodiment of the invention. The method 100 is executed by an instrument cluster display system of the motorcycle.

[030] The method 100 starts with booting up the display system upon receiving input through a communication bus that the ignition of the motorcycle is switched on (step 102). In step 104, the display system checks whether a mobile device is connected to it. If there is no confirmation that a mobile device is connected in step 104, the process continues checking whether a mobile device is connected to the display system. The checking may be done either at a regular time interval or when an event occurs, e.g. when a connection is detected or when a button (222 in Fig. 2) is selected to enable the display system to receive communication from a mobile device connected either by wire or wirelessly. If a personal digital assistant (PDA) is communicatively coupled to the display system, the display system confirms that the PDA is connected in step 104.

[031] In step 106, the PDA is synchronized with the display system. an application, for example a navigation application, running on the PDA is synchronized with the display system. If the synchronization is not successful, the process continues trying to synchronize the PDA and the display system. Once the synchronization of the PDA and display system is successful, the LCD display screen mirrors what is displaying on the PDA in step 106. An indication may be provided on the LCD display screen to indicate whether synchronization is successful or not. The indication may be in the form of an LED light (224 in Fig. 2). If synchronization is successful, the LED light may be configured to glow constantly. Otherwise, the LED light may be configured to glow discontinuously.

[032] In step 108, the display system checks whether a selection has been received to run an application, for example a navigation

application, that is available on the PDA. The selection can be made through the touchscreen of the LCD display screen. An indication (not shown in the figures), e.g. in the form of an LED light, may also be provided on the LCD display screen to indicate whether an application is running on the connected device and/or whether a selection has been received to run the application on the display system.

[033] After a selection has been made to run an application on the display system, in step 110, the display system checks whether a selection has been received to display the running application on the LCD display screen of the motorcycle, in a first display mode or a second display mode. This selection can be made through a button (220 in Fig. 2) located on the LCD display screen. The button may enable toggling between display modes. Alternatively, selecting the button may activate one of the display modes; in other words, the other display mode is automatically selected by the display system by default.

[034] In any case, if the first display mode is selected, the application running on the connected PDA is displayed on the LCD display screen, regardless of vehicle movement (step 112).

[035] If the second display mode is selected, the application running on the connected PDA is displayed upon satisfying a vehicle movement condition (step 114). In this case, there are three vehicle movement conditions to meet: detecting whether the motorcycle's brakes have been applied (114a); detecting whether the motorcycle's speed is less than 30 km/h (114b); and detecting whether the motorcycle is not accelerating, i.e. acceleration is zero or negative (114c). Therefore, method 100 includes obtaining speed data; acceleration data; and data showing whether brakes have been applied. If any of the three conditions is not satisfied, the LCD display screen of the motorcycle does not

display information received from the PDA. If all three conditions are satisfied, the application running on the connected PDA is displayed on the LCD display screen (step 116).

5 [036] In embodiments, there is also provided a display system for a vehicle. The system comprises: a display device; and a control device configured to receive a selection to display information on the display device in a first display mode or a second display mode. The display device is configured to display
10 information according to the selected display mode. In the first display mode, the information is displayed regardless of vehicle movement. In the second display mode, the information is displayed upon satisfying a vehicle movement condition based on vehicle movement data received by the display device.

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[037] Fig. 2 shows an illustration of a display device 210 of a motorcycle, according to an embodiment of the invention. The display device 210 is an LCD display screen of an instrument cluster display system of the motorcycle. Specifically, the
20 display device 210 is an alpha numeric graphical LCD display, which functions as a human machine interface that is touchscreen-enabled. Button 220 is provided as part of display device 210 to allow a user to select whether to display information on the display device 210 in a first display mode or
25 a second display mode.

[038] Fig. 3 shows an illustration of a display system 200 for a motorcycle, according to an embodiment of the invention. The display system 200 comprises: display device 210 according to the
30 embodiment of Fig. 2; and a control device 220 configured to receive a selection to display information on the display device in a first display mode or a second display mode, according to the embodiment of Fig. 2. The display device 210 is configured to display information according to the selected display mode.

In the first display mode, the information is displayed regardless of vehicle movement. In the second display mode, the information is displayed upon satisfying a vehicle movement condition based on vehicle movement data received by the display device 210. The display system 200 is communicatively coupled with a mobile device 300, such as a personal digital assistant (PDA) according to the embodiment of Fig. 1. The first and second display modes control the display of information received from the connected device 300. The display system 200 may be configured to execute the method 100. The display system 200 and the mobile device 300 can be connected by a wired or wireless communication protocol 400. To enable the communicative coupling, display system 200 comprises a communication module 230 and mobile device 300 also comprises a communication module 330.

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[039] The display system 200 may also be connected to external modules 240, such as an LED light. The LED light may be used to indicate whether an application is running on the connected device 300 and/or whether a selection has been received to run and display the application on the display system 200.

20

Patent claims

1. A method (100) of displaying information for a vehicle, the method comprising:
5 receiving (110), from a control device, a selection to display information on a display device of the vehicle in a first display mode or a second display mode;
 obtaining vehicle movement data;
 displaying information on the display device according
10 to the selected display mode (112, 116);
 wherein in the first display mode, the information is displayed regardless of vehicle movement, and in the second display mode, the information is displayed upon satisfying a vehicle movement condition based on the vehicle movement
15 data.
2. The method (100) of claim 1, further comprising: communicatively coupling (104) a mobile device to the display device,
20 wherein the first and second display modes control the display of information received from the mobile device.
3. The method (100) of claim 1 or 2, wherein the first and second display modes control the display of navigation
25 information.
4. The method (100) of any preceding claim, wherein the vehicle movement data obtained is at least one of speed, acceleration, or braking.
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5. The method (100) of any preceding claim, wherein the vehicle movement condition comprises at least one of dropping below a speed threshold, dropping below an acceleration threshold, or applying brakes.

6. The method (100) of any preceding claim, wherein the vehicle is a two-wheeler.
- 5 7. The method (100) of any preceding claim, wherein the display device is an instrument cluster display.
8. A display system (200) for a vehicle, the system comprising:
a display device (210);
10 a control device (220) configured to receive a selection to display information on the display device (210) in a first display mode or a second display mode;
wherein the display device (210) is configured to display information according to the selected display mode,
15 wherein in the first display mode, the information is displayed regardless of vehicle movement, and in the second display mode, the information is displayed upon satisfying a vehicle movement condition based on vehicle movement data obtained by the display device (210).
- 20 9. The system (200) of claim 8, wherein the first and second display modes control the display of information received from a mobile device (300) that is communicatively coupled to the display device (200) of the vehicle.
- 25 10. The system (200) of claim 8 or 9, wherein the first and second display modes control the display of navigation information.
- 30 11. The system (200) of any one of claims 8-10, wherein the vehicle movement data obtained is at least one of speed, acceleration, or braking.

12. The system (200) of any one of claims 8-11, wherein the vehicle movement condition comprises at least one of dropping below a speed threshold, dropping below an acceleration threshold, or applying brakes.
- 5
13. The system (200) of any one of claims 8-12, wherein the vehicle is a two-wheeler.
14. The system (200) of any one of claims 8-13, wherein the display device (210) is an instrument cluster display.
- 10



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Examiner: Mark Thwaites

Claims searched: 1-14

Date of search: 29 September 2020

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 3, 4, 7, 8, 10, 11, 14	US 2012/0242473 A1 (CHOI) esp WPI abstract 2012-M66685, figs 4-6 & paras 118 & 148
X	1, 3, 4, 6-8, 10, 11, 13, 14	US 2011/0006892 A1 (KARPINSKY) esp para 35 & claim 1
X	1, 3, 4, 7, 8, 10, 11, 14	US 2007/0124070 A1 (KAWAI) esp claims 2-11
X	1, 3, 4, 8, 10, 11	EP 3409088 A1 (POETTINGER) esp claims 3 & 7
X	1, 6, 8 & 13 at least	KR 1020170041418 A1 (LG) esp WPI abstract 2017-272032 (also listed as KR20170041418)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

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Worldwide search of patent documents classified in the following areas of the IPC

B60K; B60R; B62D; G01C; H04N

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, Patent Fulltext



International Classification:

Subclass	Subgroup	Valid From
B60K	0035/00	01/01/2006
B60K	0037/02	01/01/2006