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(54) **DRIVER ADVISORY SYSTEM WITH WIRELESS HUMAN MACHINE INTERFACE**

(57) The present invention relates to a system and a method of providing recommendations for action to a driver (1) of a rail vehicle, wherein a wireless network (3) is set up and used to provide a server functionality for

allowing access to the recommendations via a browser application of a mobile device (2) of the driver via the wireless network (3).

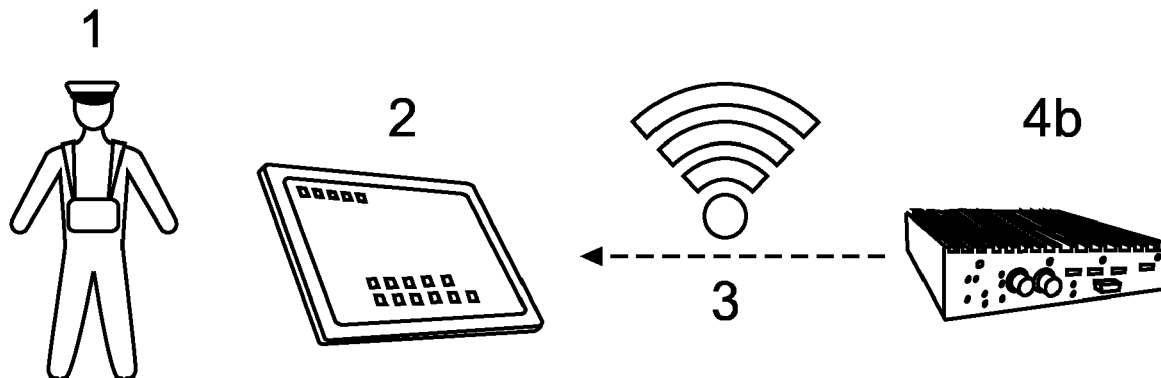


Fig. 1

Description

[0001] The present invention relates to an apparatus and a method for generating recommendations for an operator of a rail vehicle.

[0002] Assistance systems, such as driver advisory systems (DASs), for operators of rail vehicles are intended to generate action recommendations for energy-optimized operation of railway vehicles on the basis of static and dynamic route, timetable and vehicle data. Such systems are commonly integrated into the overall vehicle control system. Program modules are executed in a central control unit and possibly in remote control units fixedly embedded in the fixed rail vehicle, as so-called "embedded hardware". The recommendations are output via a display unit connected to a vehicle bus (e.g. a Multifunction Vehicle Bus) and tightly coupled to a driver panel display device (also called Human Machine Interface (HMI)).

[0003] Therefore, conventional assistance systems require installation of additional display unit(s) into the driver's cab. This causes difficulties for customers (train operating companies and car builders as well), as the driver's stand already contains several display computers. Moreover, if a conventional rail vehicle is to be retrofitted with the functionality of a driver assistance system, the vehicle control system has to be adapted to the above hardware structure, which requires extensive readmission of the rail vehicle.

The WO 2014/191269 A2 discloses a system for generating action recommendations for the operator of a rail vehicle. In order to provide a generic system that can be retrofitted quickly and easily to an existing rail vehicle, the system comprises a device that can be carried by the operator, said device having at least one data interface unit for receiving basic data, a storage unit for storing at least one program module, a processing unit provided for executing the program module in order to generate the action recommendations at least on the basis of the basic data, and an output unit for outputting the action recommendations.

[0004] However, the above described conventional architectures of assistance systems still require DAS suppliers to support hundreds of different mobile platforms. By being platform independent booming engineering efforts can be avoided and also licensing problems due to proprietary issues are less critical.

[0005] It is therefore an object of the present invention to provide an assistance system for operators of rail vehicles, by means of which installation effort can be minimized.

[0006] This object is solved by a host apparatus according to claim 1, an apparatus according to claim 6, a system according to claim 9, a method according to claim 10, a computer program product according to claim 11, a DAS application according to claim 12, and a HMI application according to claim 13.

[0007] Accordingly, recommendations for action can

be provided to a driver of a rail vehicle by setting-up a wireless network and providing a server functionality for allowing access to the recommendations via the wireless network by means of a browser application of a mobile device of the driver. Thereby, a new architecture for assistance systems is suggested, which enables usage of mobile devices (e.g. tablet computers, smartphones or the like) while avoiding the problem of high retrofitting effort and that the software has to support many different generations and versions of mobile operating systems (e.g., Andriod, iOS, Windows Mobile). Assistance systems, such as DAS, can thus be implemented as a mobile app running on train driver's mobile device (tablet, smartphone etc.), so that there is no need to install any additional display unit into the rail vehicle. Moreover, there may even be no need to install an additional antenna for communicating with wayside. Further, by avoiding mobile platform specific developments, significantly less effort is required for development of assistance systems.

[0008] As an option, the host apparatus may be adapted to run a DAS application which generates the recommendations. Thereby, a flexible DAS system can be provided, which can be readily installed in various computer systems.

[0009] As another option, the wireless network may be a wireless local area network or a Bluetooth network. Due to the standard network technology, any mobile device which can be connected to the network can be used for providing a HMI interface to the driver of the rail vehicle.

[0010] As a further option, the apparatus may be a railway compliant computer or a handheld computer and/or may be adapted to work as a communication hotspot of the wireless network. Thereby, automatic access to the assistance systems by the mobile device can be ensured as soon as the driver approaches the wireless network in or at the rail vehicle.

[0011] Furthermore, it shall be understood that the host apparatus of claim 1, the apparatus of claim 6, the system of claim 9, the method of claim 10, the computer program product of claim 11, the DAS application of claim 12 and the HMI application of claim 13 may have a similar and/or identical preferred embodiment, in particular, as defined in the dependent claims.

[0012] It shall further be understood that a preferred embodiment of the invention can also be any combination of the dependent claims or above embodiments with the respective independent claim.

[0013] The present invention will now be described based on embodiments with reference to the accompanying drawings in which:

Fig. 1 shows an assistance system according to a first preferred embodiment with computer-based application; and

Figs. 2 shows an assistance system according to a second preferred embodiment with handheld

based application.

[0014] In the following, preferred embodiments of the present invention will be described on the basis of an architecture for implementing DAS functionality in combination with an HMI application running on a mobile device.

[0015] Fig. 1 shows a schematic architecture of an assistance system according to a first embodiment where a DAS application is running on a railway compliant computer 4b. A driver 1 of the rail vehicle uses his/her own mobile device 2 (e.g. a handheld device such as a tablet or a smartphone) in the driver cabin to access and use the DAS system. When the driver enters the cabin, his mobile handset is connecting to a pre-configured, wireless network 2. The technology used for this can be any standard wireless network technology, such as IEEE 802.11, WiFi, Bluetooth or other wireless communication technology. The host computer 4b running the DAS application can be a previously installed industrial computer which can be based on a standard platform so that there is no need to support hundreds of different mobile operating systems and their variants. The host computer 4b is configured to set up the wireless network and serve as a server of the wireless network so as to feed data to the driver's own handheld device. A HMI application is running on a standard browser of the mobile device 2. This ensures that there is no need for a mobile platform specific app.

[0016] Fig. 2 shows a schematic architecture of an assistance system according to a second embodiment where a DAS application is running on a rugged, handheld computer 4a. Thus, in the second embodiment, there is no need to install anything to the train, as the driver can put the handheld computer 4a anywhere (e.g., it can even remain in his pocket).

[0017] Thus, according to the above embodiments, a DAS architecture can be provided, where the DAS application is sending and receiving data using wireless communication technology to provide wireless communication with a HMI application running on a mobile device of the driver or operator of a rail vehicle. The DAS application may be running on an industrial computer or on a standard handheld device which feeds data to mobile handsets over wireless communication and which may work or operate as a communication hotspot. A HMI application of the DAS system Driver Advisory System may be running in a browser of the mobile device.

[0018] To summarize, a system and a method of providing recommendations for action to a driver of a rail vehicle have been described, wherein a wireless network is set up and used to provide a server functionality for allowing access to the recommendations via a browser application of a mobile device of the driver via the wireless network.

[0019] It is noted that present invention is not restricted to the above preferred embodiments and can be implemented in connection with any computer devices, mobile

devices and wireless networks for any assistance systems of trains, locomotives, coaches, freight cars, trams, metros, monorails, specific rail vehicles or on-track machines.

Claims

1. A host apparatus for providing recommendations for action to a driver (1) of a rail vehicle, said apparatus (4a; 4b) being adapted to set up a wireless network (3) and to provide a server functionality for allowing access to said recommendations via a browser application of a mobile device (2) of said driver via said wireless network (3).
2. The apparatus according to claim 1, wherein said apparatus (4a; 4b) is adapted to run a driver advisory system, DAS, application which generates said recommendations.
3. The apparatus according to claim 1 or 2, wherein said apparatus is a railway compliant computer (4b) or a handheld computer (4a).
4. The apparatus according to any one of the preceding claims, wherein said wireless network is a wireless local area network or a Bluetooth network.
5. The apparatus according to any one of the preceding claims, wherein said apparatus is adapted to work as a communication hotspot of said wireless network (3).
6. An apparatus for receiving recommendations for action for a driver (1) of a rail vehicle, said apparatus (2) comprising a receiver unit for providing a connection to a wireless network (3) and a browser unit for accessing said wireless network (3) in order to retrieve said recommendations via said wireless network (3).
7. The apparatus according to claim 6, wherein said apparatus (2) comprises a human-machine interface application adapted to run on said browser unit.
8. The apparatus according to claim 6 or 7, wherein said apparatus (2) is a tablet computer or a smartphone.
9. A system for providing recommendations for action to a driver (1) of a rail vehicle, said system comprising a host apparatus according to any one of claims 1 to 5 and an apparatus according to any one of claims 6 to 8.
10. A method of providing recommendations for action to a driver (1) of a rail vehicle, said method setting-

up a wireless network (3) and providing a server functionality for allowing access to said recommendations via a browser application of a mobile device (2) of said driver via said wireless network (3).

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11. A computer program product comprising code means for producing the steps of method claim 10 when run on a computer device.

12. A DAS application adapted to run on a host apparatus (4a; 4b) according to claim 1 and to feed data to other mobile devices (2) via said wireless network (3).

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13. A human-machine interface, HMI, application adapted to run on an apparatus (2) according to claim 7 and to receive data via said wireless network (3).

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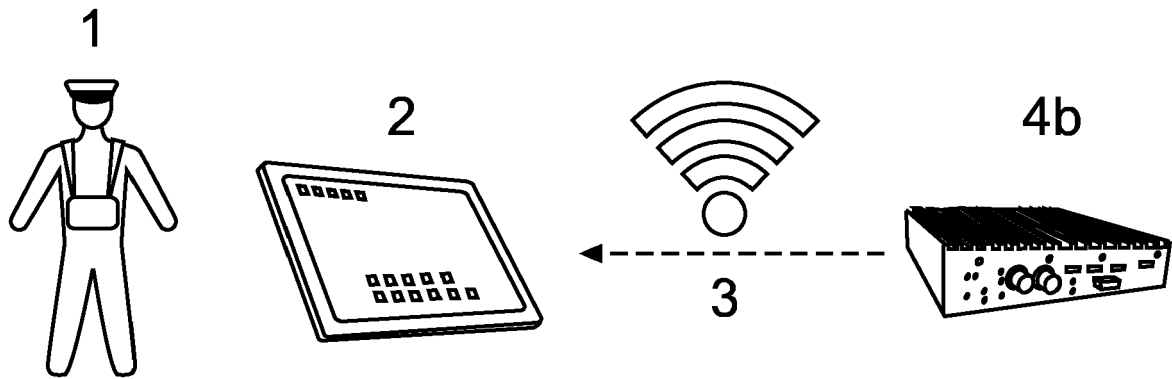


Fig. 1

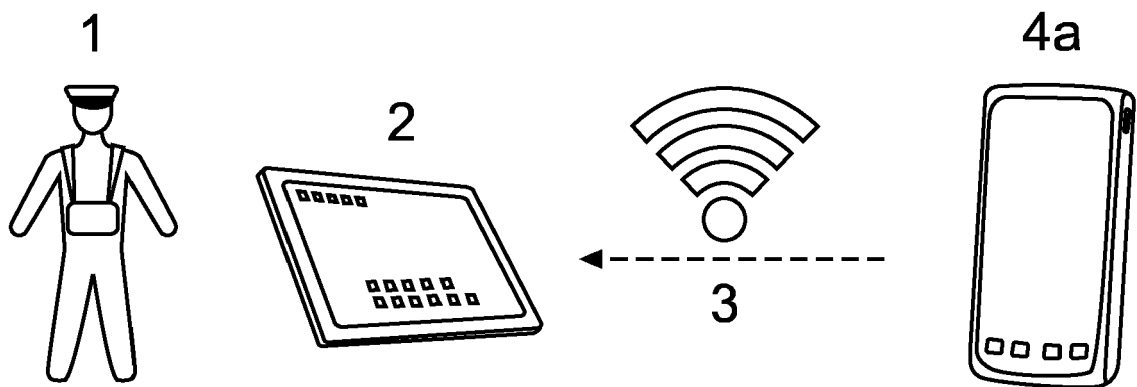


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 16 15 3559

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2010/185472 A1 (GOODERMUTH TODD [US] ET AL) 22 July 2010 (2010-07-22) * abstract * * claims 1-5; 14-17 * * paragraphs [0033] - [0044] * -----	1-13	INV. G06Q50/30
			TECHNICAL FIELDS SEARCHED (IPC)
			G06Q
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 May 2016	Examiner Neppel, Clara
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010185472 A1	22-07-2010	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- WO 2014191269 A2 [0003]