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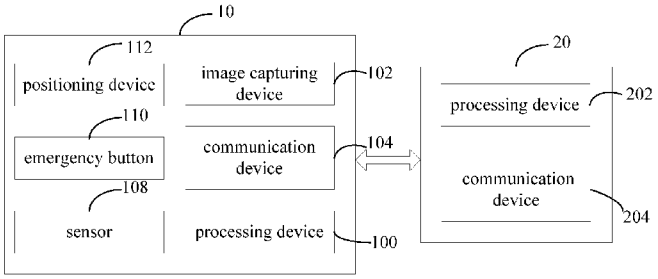

FIG. 1

(57) Abstract: A vehicle monitoring system is disclosed. The monitoring system includes: an image capturing device, configured to capture images of inner space of a vehicle; a communication device, adapted for communicating with a service system through a wireless network; and a processing device, configured to control the image capturing device to capture an image of inner space of the vehicle if a request is received by the communication device from the service system, and control the communication device to send the image to the service system. A service system and methods using the same are also provided.

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VEHICLE MONITORING SYSTEM, SERVICE SYSTEM, AND METHODS THEREOF

TECHNICAL FIELD

[0001] The present disclosure generally relates to a vehicle monitoring system, a service system, and methods thereof.

BACKGROUND

[0002] With the development of the vehicle industry, there are more and more vehicles, and vehicle safety mechanism is getting more and more important. If a driver were severely injured in a traffic accident and were unable to send out a message for help, he might not get help in time which might result in a serious consequence. If a driver encounters carjacking or kidnapping, it would be very difficult for the driver to send out a message for help. Therefore, a vehicle monitoring system is needed.

SUMMARY

[0003] Embodiments of the present disclosure provide a vehicle monitoring system, a service system and methods thereof.

[0004] In one embodiment of the present application, a vehicle monitoring system is provided. The vehicle monitoring system includes: an image capturing device, configured to capture images of inner space of a vehicle; a communication device, adapted for communicating with a service system through a wireless network; and a processing device, configured to control the image capturing device to capture an image of inner space of the vehicle if a request is received by the communication device from the service system, and control the communication device to send the image to the service system.

[0005] In some embodiments, the processing device may be further configured to generate an alert signal if a trigger signal is detected, control the communication device to send the alert signal to the service system, and control the image capturing device to

capture the image if no user instruction of canceling alert is received within a first predetermined time period since the request is received from the service system. In some embodiments, the alert signal indicates that emergency happens to the vehicle.

[0006] In some embodiments, the first predetermined time period may be 5-15 seconds.

[0007] In some embodiments, the processing device may be further configured to control the communication device to establish a voice connection between the vehicle monitoring system and the service system if no user instruction of canceling alert is received within a second predetermined time period since the request is received.

[0008] In some embodiments, the second predetermined time period may be 5-15 seconds.

[0009] In some embodiments, the vehicle monitoring system may further include a sensor configured to generate the trigger signal if an impact is detected. In some embodiments, the trigger signal may be a user instruction, for example, the trigger signal may be generated by pushing an emergency button. This will be very helpful when a driver encounters carjacking or kidnapping.

[0010] In one embodiment of the present application, a service system is provided. The service system includes: a communication device, adapted for communicating with a monitoring system mounted on a vehicle through a wireless network; and a processing device, configured to generate a request upon receiving an alert signal from the vehicle monitoring system through the wireless network, control the communication device to send the request to the vehicle monitoring system, and control the communication device to receive an image of inner space of the vehicle from the monitoring system which image is captured in response to the request.

[0011] In one embodiment of the present application, a method for monitoring a vehicle is provided. The method may include: receiving a request from a service system; controlling an image capturing device mounted on the vehicle to capture an image of

inner space of the vehicle in response to the request; and sending the image to the service system through the wireless network.

[0012] In some embodiments, the method may further include: generating an alert signal after a trigger signal is detected; sending the alert signal to the service system through the wireless network, where the request is generated in response to the alert signal.

[0013] In some embodiments, the method may further include: controlling the image capturing device to capture the image in response to the request, if no user instruction of canceling alert is received within a first predetermined time period since the request is received.

[0014] In some embodiments, the method further includes: controlling the communication device to establish a voice connection between the vehicle monitoring system and the service system if no user instruction of canceling alert is received within a second predetermined time period since the request is received.

[0015] In one embodiment of the present application, a method for monitoring a vehicle is provided. The method includes: generating a request upon receiving an alert signal indicating that emergency happens to the vehicle from the vehicle through a wireless network; sending the request to the vehicle through the wireless network; and receiving from the vehicle an image of inner space of the vehicle through the wireless network which image is captured by the vehicle in response to the request.

[0016] When a vehicle encounters an emergency event, such as a crash, carjacking or kidnapping, the situation can be observed promptly using the monitoring system, the service system and methods thereof according to embodiments of the present disclosure. Accordingly, the driver can be rescued in time even if the driver is unable to send out a message for help.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The foregoing and other features of the present disclosure will become more

fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only several embodiments in accordance with the disclosure and are, therefore, not to be considered limiting of its scope, the disclosure will be described with additional specificity and detail through use of the accompanying drawings.

[0018] Fig.1 illustrates a schematic block diagram of a vehicle monitoring system in communication with a service system according to one embodiment of the present disclosure; and

[0019] Fig.2 illustrates a schematic flow chart of a method for monitoring a vehicle according to one embodiment of the present disclosure.

DETAILED DESCRIPTION

[0020] In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. In the drawings, similar symbols typically identify similar components, unless context dictates otherwise. The illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented here. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the Figures, can be arranged, substituted, combined, and designed in a wide variety of different configurations, all of which are explicitly contemplated and make part of this disclosure.

[0021] Fig.1 illustrates a schematic block diagram of a vehicle monitoring system 10 in communication with a service system 20 according to one embodiment of the present disclosure. In some embodiments, the vehicle monitoring system 10 (referred to as monitoring system hereinafter) may be mounted on a vehicle. The service system 20 may be located in a service center to monitor one or more vehicle carrying the monitoring system 10. In some embodiments, the monitoring system 10 may

communicate with the service system 20 through a wireless network, such as a 3G or a 4G mobile network.

[0022] Referring to Fig.1, the monitoring system 10 may include a processing device 100, an image capturing device 102 and a communication device 104.

[0023] The processing device 100 may be configured to control the image capturing device 102 to capture an image of inner space of the vehicle if a request is received by the communication device 104 from the service system 20, and control the communication device 104 to send the image to the service system 20. In some embodiments, the processing device 100 may be a CPU, or a GPU, or a DSP etc., or any combination thereof. In some embodiments, the processing device 102 may be a combination of a plurality of computing components and other components.

[0024] In some embodiments, the image capturing device 102 may be a digital camera, or other types of image capturing devices.

[0025] The service system 20 may include a processing device 202 and a communication device 204.

[0026] Hereinafter, embodiments of the method for monitoring a vehicle will be described in detail in accompany with Fig.1 and Fig.2. Fig.2 illustrates a schematic flow chart of a method S100 for monitoring a vehicle according to one embodiment of the present disclosure.

[0027] Referring to Fig.2, in S101, generating a trigger signal. In some embodiments, the trigger signal may be generated when an impact e.g. a car crash is detected. In some embodiments, the trigger signal may be a user instruction, for example, the trigger signal may be generated by pushing an emergency button.

[0028] Optionally, the monitoring system 10 may further include a plurality of sensors 108, and a BUS (not shown in the drawings). The plurality of sensors 108 may be communicatively coupled together through the BUS. As an example, the BUS may be a controller area network (CAN) BUS. In some embodiments, the plurality of sensors

108 can generate the trigger signal if an impact is detected by the sensors 108.

[0029] Optionally, the monitoring system 10 may further include an emergency button 110. In some embodiments, the trigger signal may be a user instruction generated by the driver pushing the emergency button 110 in emergency cases, such as carjacking or kidnapping. The emergency button 110 may be arranged near the driver's seat for convenience. This will be very helpful when the driver encounters carjacking or kidnapping.

[0030] In S102, generating an alert signal after the trigger signal is detected. In some embodiments, the processing device 100 may be configured to generate the alert signal after the trigger signal is detected. In some embodiments, the alert signal indicates that emergency happens to the vehicle. For example, the alert signal may indicate an occurrence of a car crash, which may be detected by the sensors 108, or the alert signal may indicate that the vehicle encounters carjacking or kidnapping.

[0031] In S103, sending the alert signal to the service system 20 through a wireless network. In some embodiments, the processing device 100 may be configured to control the communication device 104 to send the alert signal to the service system 20 through the wireless network, such as a 3G or a 4G mobile network.

[0032] In S201, the service system 20 receiving the alert signal. In some embodiments, the alert signal is received by the communication device 204.

[0033] In S202, generating a request in response to the alert signal. In some embodiments, the processing device 202 of the service system 20 may be configured to generate a request upon receiving the alert signal from the monitoring system 10. In some embodiments, the service system 20 may further include a user interface (not shown in drawings) for interaction with an operator. In general, the operator is arranged to monitor the vehicle through the user interface.

[0034] In some embodiments, upon receiving the alert signal, a reminder may be presented, e.g. through a pop-up window, to inform the operator.

[0035] Referring to Fig.2, in S203, sending the request to the vehicle through the wireless network. In some embodiments, the processing device 202 is configured to control the communication device 204 to send the request to the monitoring system 10.

[0036] It should be noted that the request from the service system may be a request for a voice connection, a video connection, or both a voice and a video connection. In some embodiments, the request may be a request for one or more images captured by the image capturing device 102. In some embodiments, the service system 20 may send a request for a voice connection, e.g., call the driver in the vehicle.

[0037] In S104, receiving the request from the service system 20. In some embodiments, the communication device 104 of the monitoring system 10 may receive the request through the wireless network.

[0038] In S105, controlling the image capturing device 102 mounted on the vehicle to capture an image of inner space of the vehicle in response to the request. In some embodiments, an image of inner space may be an image of the driver. In some embodiments, an image of inner space may be an image of substantially the whole inner space of the vehicle.

[0039] In some embodiments, the processing device 100 may be configured to control the image capturing device 102 to capture the image of inner space of the vehicle if a request is received by the communication device 104 from the service system 20.

[0040] Optionally, the processing device 100 may be configured to control the image capturing device 102 to capture the image of inner space of the vehicle when the trigger signal is detected which trigger signal may be generated by the plurality of sensors 108 or by pushing the emergency button 110.

[0041] In the event that a request for a video connection is received from the service system 20, there are occasions that the driver can not input a user instruction of canceling alert. For example, the driver is injured severely, and is unable to make a response to the request. In some embodiments, in S105,if no user instruction of

canceling alert is received within a first predetermined time period since the request is received, controlling the image capturing device 102 mounted on the vehicle to capture an image of inner space of the vehicle in response to the request. In some embodiments, the first predetermined time period may be set as 5 seconds, 10 seconds, 15 seconds, 1 minute, 2 minutes, or 5 minutes and so on.

[0042] In the event that a request for a voice connection is received from the service system 20, for example, the operator may try to call the driver in the vehicle, there are occasions that the driver can not input a user instruction of canceling alert. For example, the driver may be injured severely, and can not move. In some embodiments, in S105, if no user instruction of canceling alert is received within a second predetermined time period since the request is received, controlling a communication device 104 mounted on the vehicle to establish a voice connection between the monitoring system 10 and the service system 20 in response to the request. In this way, the driver himself can send out a message for help in time and report what happened to the vehicle. In some embodiments, the second predetermined time period may be set as 5 seconds, 10 seconds, 15 seconds, 1 minute, 2 minutes, or 5 minutes and so on.

[0043] In some embodiments, if the user instruction of canceling alert is received, the processing device 100 may not control the image capturing device 102 to capture images of inner space of the vehicle, or may not control the communication device 104 to establish the voice connection, and may generate an alert canceling signal, and may control the communication device 104 to send the alert canceling signal to the service system 20 to inform the service system 20 that no help or assistance is needed.

[0044] In S106, sending the image to the service system through the wireless network. After capturing the image of inner space of the vehicle, the processing device 100 may control the communication device 104 to send the captured image to the service system 20 through the wireless network.

[0045] In S204, receiving from the vehicle the image of inner space of the vehicle through the wireless network. In some embodiments, the processing device 202 of the

service system 20 may be configured to control the communication device 204 to receive images of inner space of the vehicle from the monitoring system 10. If the operator confirms that there is emergency after checking the image or after a conversation with the driver, the operator may inform a rescue team to take actions, e.g. call the hospital.

[0046] Optionally, the monitoring system 10 may further include a positioning device 112 for obtaining position information of the monitoring system 10. For example, the positioning device 112 may be a GPS.

[0047] In some embodiments, the method S100 may further include obtaining position information of the vehicle carrying the monitoring system 10 and transmitting the position information to the service system 20, which is known in the art, and is not described in detail herein. The rescue team can reach the vehicle having the monitoring system 10 based on position information obtained by the positioning device 112.

[0048] In some embodiments, the service system 20 may send to the monitoring system 10 instructions of capturing images of different parts of the inner space of the vehicle. The processing device 100 may be further configured to control the image capturing device 102 to capture images of different parts of the inner space of the vehicle.

[0049] In some embodiments, the service system 20 may further include a storage device (now shown) which stores therein a user database. The user database may include various kinds of information of users, such as name, ID number, contact information, picture etc. A user may be a registered owner of a vehicle. The processing device 202 may be further configured to control a display device (now shown) to present to the operator certain information of a user when an alert signal is received from a vehicle owned by the user.

[0050] As described above, when a vehicle encounters emergency events, such as a crash or kidnapping, a driver in the vehicle can send out a message in time and the vehicle situation can be observed promptly by using the vehicle monitoring system, the

service system and methods thereof according to the present disclosure. Accordingly, a quick post-accident action can be taken to rescue the driver's life.

[0051] While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope and spirit being indicated by the following claims.

We claim:

1. A vehicle monitoring system, comprising:

an image capturing device, configured to capture images of inner space of a vehicle;

a communication device, adapted for communicating with a service system through a wireless network; and

a processing device, configured to control the image capturing device to capture an image of inner space of the vehicle if a request is received by the communication device from the service system, and control the communication device to send the image to the service system.

2. The vehicle monitoring system according to claim 1, wherein the processing device is further configured to control the image capturing device to capture the image if no user instruction of canceling alert is received within a first predetermined time period since the request is received from the service system.
3. The vehicle monitoring system according to claim 1, wherein the processing device is further configured to generate an alert signal indicating that emergency happens to the vehicle if a trigger signal is detected, control the communication device to send the alert signal to the service system, where the request is generated in response to the alert signal.
4. The vehicle monitoring system according to claim 3 further comprising at least one sensor for detecting impact, where the trigger signal is generated when an impact is detected by the at least one sensor.
5. The vehicle monitoring system according to claim 1 further comprising a positioning device for obtaining position information of the vehicle, where the processing device is further configured to control the communication device to send position information of the vehicle obtained by the positioning device to the service system in response to the request.
6. A service system, comprising:

a communication device, adapted for communicating with a vehicle monitoring system mounted on a vehicle through a wireless network; and

a processing device, configured to generate a request upon receiving an alert signal from the vehicle monitoring system, control the communication device to send the request to the vehicle monitoring system through the wireless network, and control the communication device to receive an image of inner space of the vehicle from the vehicle monitoring system which image is captured in response to the request.

7. A method for monitoring a vehicle, comprising:

receiving a request from a service system through a wireless network;

controlling an image capturing device mounted on the vehicle to capture an image of inner space of the vehicle in response to the request; and

sending the image to the service system through the wireless network.

8. The method according to claim 7, further comprising:

generating an alert signal after a trigger signal is detected; and

sending the alert signal to the service system through the wireless network, where the request is generated in response to the alert signal.

9. The method according to claim 7, further comprising:

controlling the image capturing device to capture the image in response to the request, if no user instruction of canceling alert is received within a first predetermined time period since the request is received.

10. A method for monitoring a vehicle, comprising:

generating a request upon receiving an alert signal indicating that emergency happens to the vehicle from the vehicle through a wireless network;

sending the request to the vehicle through the wireless network; and

receiving from the vehicle an image of inner space of the vehicle through the wireless network which image is captured by the vehicle in response to the request.

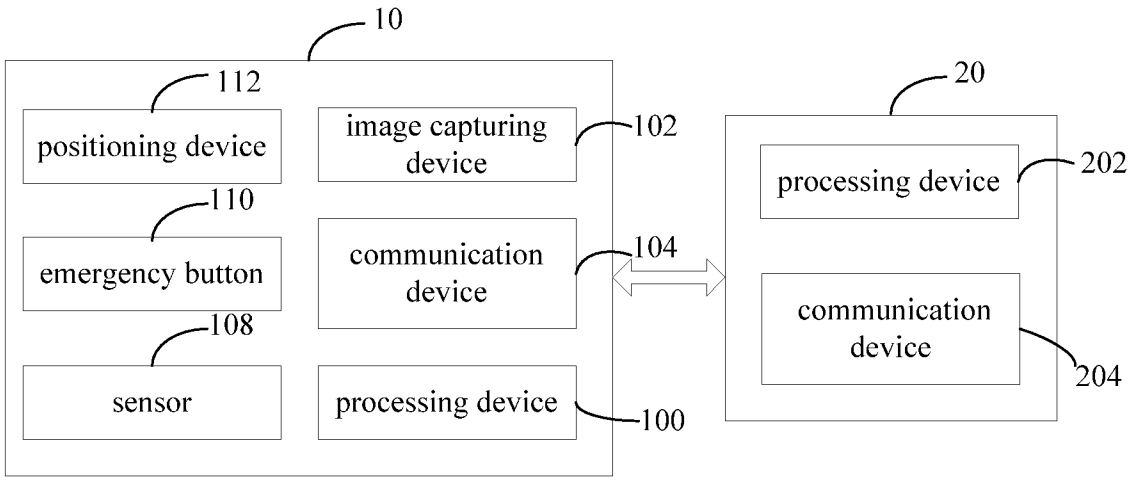
10
112
positioning device
image capturing device
102
110
emergency button
communication device
104
108
sensor
processing device
100
20
processing device
202
communication device
204

FIG. 1

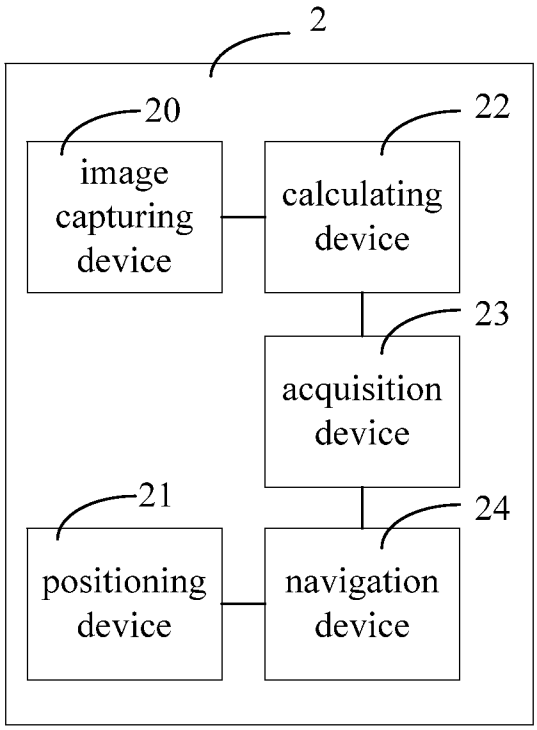
2
20
image capturing device
22
calculating device
23
acquisition device
21
positioning device
24
navigation device

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/082274

A. CLASSIFICATION OF SUBJECT MATTER

G06K 9/20 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: G06K 9/-, G08B 25/-, B60R 21/-, B60R 25/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CPRSABS, CNTXT, VEN, CNKI: vehicle, car, automobile, image, monitor, surveil, impact, accident, sensor, capture, inner, inside

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 1524737 A(BEIJING VIMICRO CORP) 01 September 2004(01.09.2004) description page 2 line 3 to page 7 line 18, figure 1	1, 5, 7
Y		2-4, 6, 8-10
Y	CN 101178836 A(ZHANG J)14 May 2008(14.05.2008) description page 2 line 3 to page 8 line 18, figures 1-2	2-4, 6, 8-10
A	CN 1832521 A(LG ELECTRONICS INC) 13 September 2006(13.09.2006) the whole document	1-10
A	KR 20060026204 A(LG DACOM CORP)23 March 2006(23.03.2006) the whole document	1-10
A	US 2005099272 A1(CHIANG H et al.) 12 May 2005(12.05.2005) the whole document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 May 2013(29.05.2013)	**13 Jun. 2013 (13.06.2013)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer XU, Lin Telephone No. (86-10)62412170

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/082274

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 1524737 A	01.09.2004	CN 1276853 C	27.09.2006
CN 101178836 A	14.05.2008	None	
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KR 20060026204 A	23.03.2006	KR 100661189 B1	26.12.2006
US 2005099272 A1	12.05.2005	None	