(54) **Telematic system of emergency call**

(57) The invention of Emergency call Telematic system will allow more reliable detection of the emergency call activation cause. It supplements the mobile unit of the emergency call system with the source of photo or video information including its digital processing, with the source of additional information including its processing, with the database module with the black box function integrated intelligence in order to enable the emergency call centre to process photo or video information, to process the additional information where the processed data are evaluated by the logic determining the degree of accident severity, degree of injury, degree of the dangerousness etc. and this information forms the basis for the control centre. Further, the system allows the broadcasting and receiving SOS calls within a short distance.

We can see the main possibilities for the application of the invention especially in case of accidents of individual vehicles, vehicles transporting dangerous loads, in case of kidnapped vehicles (e.g. transporting financial amounts). As a result of the improved features for emergency call evaluation by the supervisor, we can easily recognize a false alarm caused by either a deliberate or unintentional emergency call, which can for example help to increase the efficiency of rescue brigades.

Fig. 1 - Emergency call Telematic system

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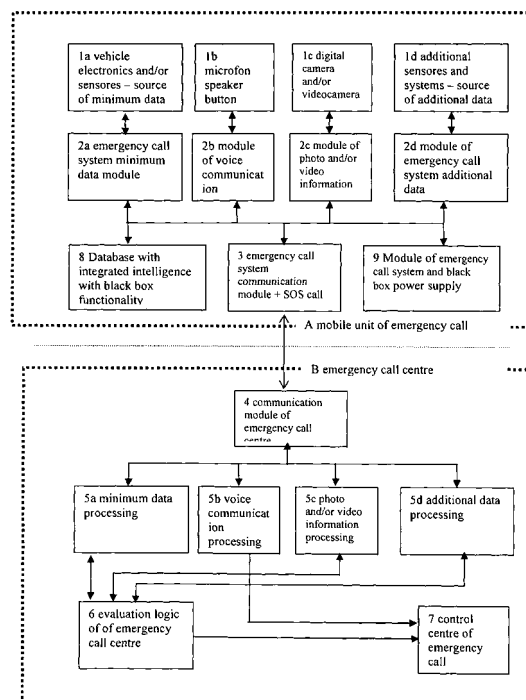
Description

Area of technology

[0001]   Emergency call Telematic system is based on the existing system of emergency call, represented by modules 1a, 2a, 1b, 2b, 3, 4, 5a, 5b and 7 in Figure 1, with added modules of photo and/or video information (2c) processing the data from the digital (video)camera (1c) installed in the vehicle or in the equipment of the emergency call user (PDA, mobile phone etc.) and/or additional data module (2d) processing the data from the additional data source (1d), for example data from a chip card carrying data on a transported dangerous load, data from an electronic freight bill etc., plus a database with added intelligence with the black box function (8) and/or added functionality of a communication module (3) for SOS call broadcasting and SOS announcements receiving within a short distance, notifying passing by vehicles or drivers of an occurred extraordinary situation within their vicinity (accidents etc.). On the side of the emergency call centre there is module 5c, connected to the existing systems represented by the modules 4, 5a, 5b and 7, for the processing of photo and/or video information and/or module 5d for the processing of additional data and/or module 6 of evaluation logic automatically determining the degree of the vehicle passengers' injuries, degree of dangerousness in case of hazardous load transport, information on false alarm etc. in order to give the control centre reliable basis for the choice of rescue measures. If it is not possible to connect the emergency call Telematic system to the vehicle electronics (for example if the vehicle is older and it is not equipped with an electronic bus, the manufacturer did not enable an interface for the emergency call system etc.), the vehicle electronics data are replaced with autonomous sensors of the emergency call Telematic system (1a), for example with the built-in accelerometers, gyroscopes, GPS receiver etc. which make it possible to receive and process necessary data without the need of vehicle electronics.

Current State of the Art

[0002]   The current state of the emergency call system technique (e-call) consists in sending digital messages (1a, 2a) to the centre of emergency signals processing (5a) together with a voice channel (1b, 2b and 5b). Selected data contain the data complying with the definition of so called minimum and/or complete data, e.g. the information on caller's position, caller's travel direction, caller's vehicle identification number (VIN code) etc.
The current state of technology enables to automatically/ manually make an emergency call to 112 and simultaneously sent the aforesaid minimum as well as complete data, which will only be displayed in the emergency call control centre.
The exiting solution of emergency calling has a lot of disadvantages. E.g. it is not possible for the emergency calls centre (7) to find out if the alarm is false or not (e.g. if none voice had be heard the caller can be either unconscious or the caller is silent deliberately in case of false emergency call). In case of serious injury the voice message from the caller does not provide any relevant information on the level of personal injuries. This disadvantage can be compensated by adding photo and/or video data (1c, 2c and 5c) acquired from the caller's or crashed car's unit, where - despite the inaccessibility of voice information - it is possible to assess the severity of the car accident and/or the caller's state when making the emergency phone call using e.g. a mobile phone.
Another disadvantage of the existing emergency calling solution lies in the fact that it is separated from the vehicle black box system - if the vehicle is equipped with a black box, the two systems are completely different. This disadvantage is removed in the proposed solution the following way: a database (8) is connected to the data and photo/video information system with its own integrated intelligence for recording information important for insurance companies, police and further accident investigation, where photo and/or video information can clarify many more car/aircraft accidents etc. compared to the current state, where the black box records only data messages and/or voice instructions made by the crew etc.
Another disadvantage is that the current system of emergency calls is only adapted to individual vehicles while it is not adapted to e.g. the transport of dangerous loads, stolen car, vehicle transporting financial amounts, railway vehicles etc. For these applications, where the emergency calls system has far-reaching social consequences, it is possible to remove this imperfection by adding a module for additional data processing (2d) processing data from various sensors (1d), e.g. tank temperature, smoke presence in a cabin etc. and in case limit values of these sensors are exceeded the module (2d) ensures an automated emergency call including the transmission of all available information (minimum data, voice, photo and/or video, additional data). The source of additional data (1d) can be either the sensors or external information read from the load chip card, electronic freight bill, digital tachograph, from electronic road-toll system, etc. where it is typically an UN code of the transported dangerous item etc. On the emergency call centre side the additional data are responded to by the module designed for their processing (5d). The data plus photo/video signal are automatically recorded and stored in the database (8) for a predefined period of time (in case of an extraordinary situation they are not erased and the site is archived for further investigation - which makes it difficult for the car driver or owner to act fraudulently).
Another disadvantage of the current system is that the information on the accident are via the current communication channel (3)- typically a GSM module - transferred only to the control centre and not to nearby vehicles. This disadvantage is eliminated in the proposed solution by completing the function of a communication channel (3) with a function of SOS call broadcasting with-

in a short distance notifying passing by vehicles of the occurred extraordinary situation (e.g. a car accident), where this solution prevents any potential occurrence of multiple car accidents. The communication module (3) is also able to receive a SOS call from another vehicle being in an extraordinary situation and to notify the driver of such an extraordinary situation, e.g. a car accident, via e.g. a car speaker (1b).

Another disadvantage of the existing emergency call system lies in the fact that the minimum data are graphically presented only at the control centre (7) and their evaluation is left under the discretion of the supervisor. Should the data be completed with photo and/or video information or additional information, the supervisor could end up overloaded with information. For this reason the proposed solution contains also a module of evaluation logic (6), which processes all the available data and/or voice information and determines the degree of accident severity, degree of accident dangerousness, level of passengers' injuries, degree of false alarm, fill in the necessary tables for the supervisor etc. The supervisor subsequently approves or changes the preset rescue action to be carried out, check the available information and starts the rescue action. The evaluation logic (6) also carries out statistical investigation concerning individual calls, prepares background details necessary for prevention etc. and provides this information to other users - typically to public administration and municipal governments etc.

Technical Solution Basis

[0003]   The invention eliminates the aforesaid imperfections of the current emergency calls system solution and completes the mobile unit of emergency call system (A) with a source of photo and/or video information (1c) including their digital processing (2c) and/or a source of additional information (1d) including their processing and/or with a module of database with integrated intelligence with a black box functionality (8) in such a way to enable the emergency call centre (B) to process the photo and/or video information in the module 5c and/or to process additional information in the module 5d, where are the processed data are evaluated in the logic 6 determining the degree of accident severity, level of injury, degree of dangerousness etc. and this information serves as ground data for the control centre (7). It further completes the communication module 3 with a function of SOS call broadcasting within a short distance notifying the passing by vehicles of the occurred accident, preventing the potential occurrence of multiple accidents. The communication module (3) is also able to receive a SOS call from another vehicle being in an extraordinary situation and to notify the driver of such an extraordinary situation, e.g. a car accident, via e.g. a car speaker (1b).

Solution Overview in Picture 1

[0004]   Other advantages and benefits of the technical solution are clearly shown in the attached drawing (Figure 1) of the Emergency Call Telematic System consisting of part A - emergency call mobile unit - and part B - emergency call centre, which are interconnected via a wireless communication network (e.g. a GSM mobile network). In the part A of the emergency call mobile unit there are connected to the common bus the modules 8 of a database with integrated intelligence with the function of vehicle black box, module 3 a communication module of emergency call system (e-call) between the A and B parts (typically GSM, UMTS, etc.) with a function of SOS communication within a short distance (typically DSRC, IR, CALM, etc.), module 9 module of emergency call systems and black box power supply and modules 2a - 2d serving for the collection of data necessary for emergency call evaluation. Each of these 2a - 2b modules is connected to a relevant sensor which physically acquires ground data for evaluation i.e. the module 2a - module of emergency call system minimum data - is connected to module 1a car electronics and/or sensors - source of minimum data, the module 2b - voice communication module - is connected to module 1b = microphone, speaker, button, the module 2c - module of photo and/or video information - is connected to module 1c = a digital camera and/or video camera and the module 2d - module of additional data of the emergency call system - is connected to module 1d = additional sensors and systems - source of additional data. In part B - emergency call centre - the module 4 - communication module of the emergency call centre - is connected to the parallel processing of data from the emergency call mobile unit i.e. to module 5a = minimum data processing, module 5b = voice communication processing, 5c = photo and/or video information processing and 5d = additional data processing. The output from 5a, 5c and 5d modules is further evaluated in module 6 = evaluation logic of the emergency call centre and the output from module 6 is together with the output prom module 5b connected to module 7 emergency call control centre.

Examples of Technical Solutions

1. Individual Car Accident

[0005]   In case of a car accident, besides minimum data (1a, 2a) and voice communication (1b, 2b) 3 also photo and/or video information (1c, 2c) is sent via the communication module. These pieces of information are processed in the emergency call centre (B) and a supervisor or evaluation logic (6) can better assess the extent of the injury and assign the highest priority to the accident if necessary. Simultaneously it is possible to find out immediately if this a case of false alarm activated by deliberate/unintentional emergency call. This will lower the number of false calls rescue actions and the rescue brigades will be used more efficiently. Module 8 will record all historical data and enables to carry out a reconstruction of the accident including the 3dimensional model of

the accident and to better clarify the causes of the accident. The additional function of module 3 ensures immediate broadcasting/receiving of SOS call within a short distance notifying passing by vehicles of the occurred extraordinary situation (e.g. a car accident), thus preventing multiple car accidents. If a car equipped with an emergency call telematic system comes near an extraordinary situation (e.g. a car accident), the emergency call telematic system receives the SOS call and notifies the driver of such an extraordinary situation via a car speaker (1b).

2. Accident of a car transporting a dangerous load

[0006]   For cars transporting dangerous loads we can allow for the electronic freight bill prepared for transport initiation. The electronic freight bill can be uploaded (e.g. in the chemical plant) onto the chip card, which is then inserted into the emergency call system as a source of additional information (1d). It is possible to ensure that a vehicle without an inserted chip car is not able to move. In case of a car accident these data are processed in module 2d and sent to the emergency call centre B, where they are further processed in module 5d and evaluated in module 6. Another possibility is to use, besides the electronic freight bill, also information from the sensors (temperature, pressure etc. in the tank), where such data also form a part of additional data 1d. These data are processed in module 2d and if defined limit values or their predefined combination are exceeded, the system initiates an emergency call via the mobile unit A, which sends are available information to the centre B.

3. Stolen car emergency call

[0007]   In case of car being stolen and taken away the emergency call system is initiated either manually by the driver and/or automatically if a predefined emergency situation occurs (e.g. the car leaves the predefined route in case of financial amounts transportation, loud argument in the cabin, etc.). The emergency call system sends all the data into the processing centre B continuously and/or upon a request from the centre B. Thus the supervisor can have relevant information on the emergency situation and to better ensure the rescuing operations. Simultaneously, the data are stored into module 8, which later contributes to the car stealing case clearing up.

4. Emergency call from a mobile phone

[0008]   When an emergency call is made from a mobile phone, smart phone, PDA, and/or another mobile device A the completion of transmitted information with minimum data is already a commonplace in the USA. Today, advanced phones are and nearly every phone in the future will be equipped with a digital camera and/or a video camera. When an emergency call is activated it is possible to simply send the photo and/or video information to the emergency call centre B, where is it possible to automatically (6) or manually find out if the emergency call is a false alarm or not. The majority of useless rescue actions is nowadays caused by false calls - unavailability of precise data for localization (a part of minimum data) and unavailability of photo and/or video information from the emergency call spot (typically the caller's photo).

Fields **of** *possible industrial* **usage**

[0009]   The proposed solution enables more detection of emergency call activation cause, its interconnection with other car systems, it enables using the emergency call systems application even in older cars, which are not e.g. equipped with CAN bus, enables better evaluation of the emergency call on the supervisor's side and helps to prevent multiple car accidents. All in all, this will facilitate a massive expansion and further development of the emergency call service.

Claims

1. Emergency call Telematic system using the visual information for the verification of the emergency situation with the intelligent processing and transmission of the visual information into the emergency call centre, **featuring** a mobile unit of emergency call system (A) supplemented with the source of photo and/or video information (1c) including its digital processing (1d) and/or with the source of additional information (1d) including its digital processing (1d) and/or with the database with the black box function added intelligence (8) in order to enable the emergency call centre (B) to process photo and/or video information in the module (5c) and/or to process the additional information in the module (5d) while the processed data are evaluated in the logic (6) determining the degree of an accident severity, degree of injury, degree of dangerousness etc. and this information forms the basis for the control centre (7).

2. Emergency call Telematic system as per claim 1, **featuring** the added system of built-in sensors (1a) of the following types - set of accelerometers, gyroscopes, GNSS receiver etc., autonomously providing similar minimum data like vehicle electronics without the need of the emergency call Telematic system connection to the vehicle bus.

3. Emergency call Telematic system as per claim 1, **featuring** the added power supply module (9) supplying the electric power even in case of serious damage of the emergency call Telematic system **characterised by** critical parts of the mobile unit (A), typically sensors (1a), the module (2a) and the database (8), being installed into the vehicle's battery.

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4. Emergency call Telematic system as per claim 1, **featuring** the communication module (3) being supplemented with the functionality of SOS call short distance broadcasting and receiving, where an SOS call is sent automatically after an accident, and in the case an SOS call has been received from another vehicle by the emergency call Telematic system, the driver is notified of the extraordinary situation by e.g. a speaker (1b).
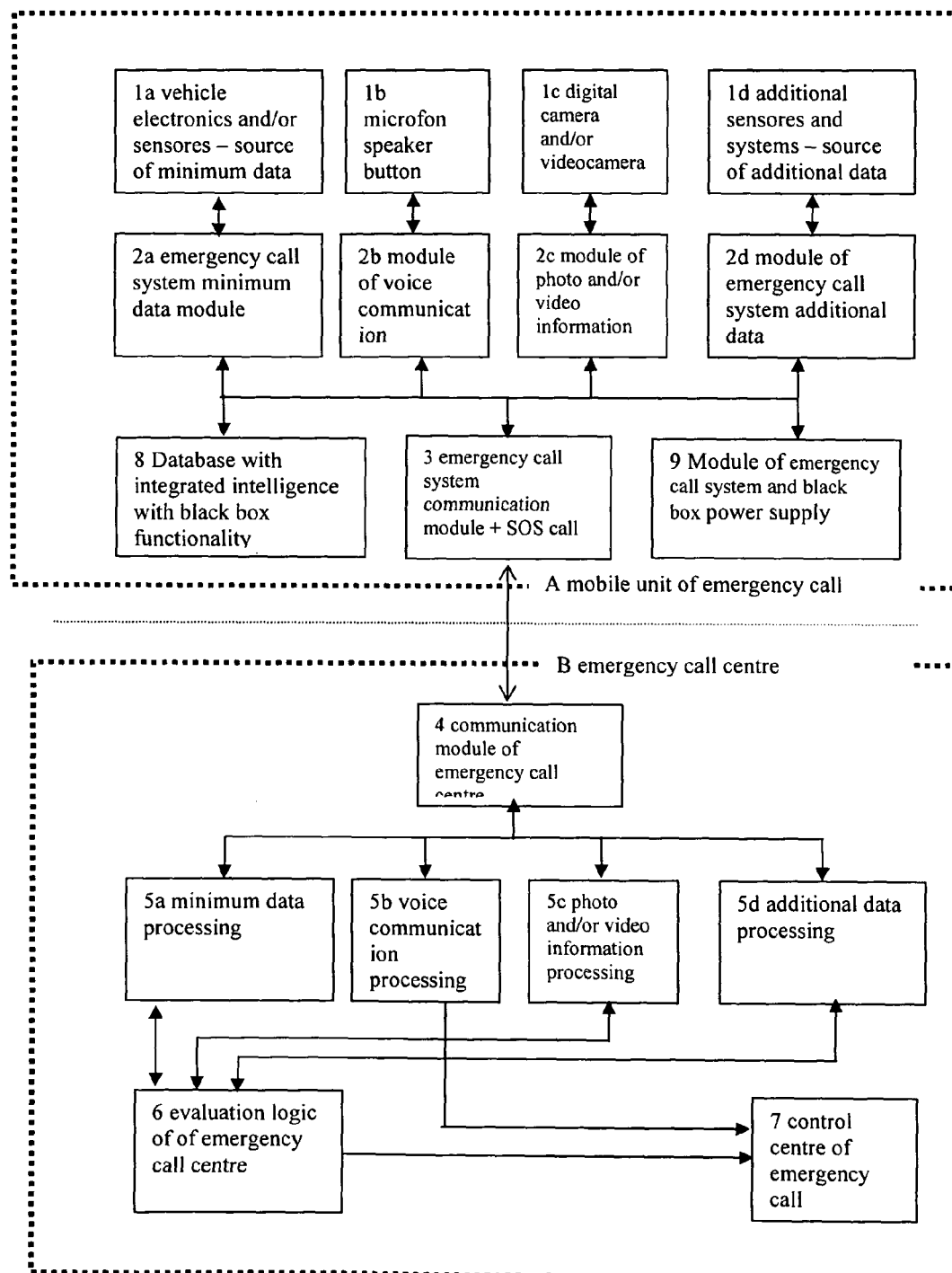
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Fig. 1 - Emergency call Telematic system

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 07 46 6006

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Y	EP 1 262 935 A1 (SIEMENS AG [DE]) 4 December 2002 (2002-12-04) * paragraph [0022] * * figure 2 *	4	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 June 2007	Meister, Mark

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EUROPEAN SEARCH REPORT

Application Number

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