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(71) Applicant: **9Solutions Oy**
90590 Oulu (FI)

(72) Inventors:
- **Liimatainen, Tomi**
  90590 Oulu (FI)
- **Herrala, Sami**
  90590 Oulu (FI)
- **Luttinen, Tapani**
  90590 Oulu (FI)

(74) Representative: **Kolster Oy Ab**
Salmisaarenaukio 1
P.O. Box 204
00181 Helsinki (FI)

(54) TESTING A PERSONAL SAFETY DEVICE

(57) This document discloses a solution for testing a personal safety device in a convenient manner. According to an aspect, a method comprises in a mobile testing device: acquiring a device identifier from the personal safety device; selecting the personal safety device for testing; sending, to a server configured to receive alarm messages from the personal safety device, a message indicating a test mode for testing the personal safety device, the message disabling alarming for the personal safety device at the server; receiving, during the testing, an alarm message from the personal safety device over a direct radio link between the mobile testing device and the personal safety device, wherein the alarm message from the personal safety device indicates depression of an alarm button of the personal safety device; and in response to receiving the alarm message, indicating an alarm condition on a user interface of the mobile testing device.

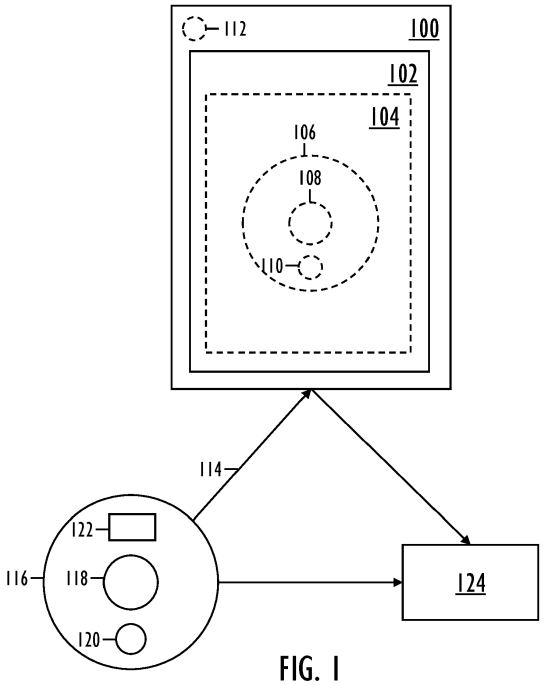

FIG. 1

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Description

FIELD

[0001] Various embodiments relate to a method, apparatus and computer program product for testing a personal safety device, and a personal safety system.

BACKGROUND

[0002] Personal safety devices may be used request help in an emergency, such as a medical emergency. Personal safety devices may be used in hospitals, care homes, in the context of home care, or in other situations where the risk of a medical emergency is high. A personal safety device may be carried by a person, such as a patient or an elderly person, who at risk of the medical emergency. A personal safety device may also be carried by someone caring for the person at risk, such as a nurse or a caregiver. The latter group may also use personal safety devices to improve their own safety, such as in the case of a patient exhibiting violent behaviour towards them.

[0003] Regular testing of personal safety devices is often recommended. However, the testing may be inconvenient, and users may experience difficulties when testing their personal safety devices. Moreover, alerting emergency services for testing purposes may increase their workload significantly due to false alarms generated by the testing. Further sophistication may therefore be desirable.

BRIEF DESCRIPTION

[0004] According to an aspect, there is provided subject matter of independent claims. Dependent claims define some embodiments.

[0005] One or more examples of implementations are set forth in more detail in the accompanying drawings and the description of embodiments.

LIST OF DRAWINGS

[0006] Some embodiments will now be described with reference to the accompanying drawings, in which

FIG. 1 illustrates embodiments of a mobile testing device and a personal safety system;
FIG. 2 illustrates embodiments of a personal safety system;
FIG. 3 illustrates embodiments of a method for testing a personal safety device;
FIG. 4 illustrates embodiments related to acquiring a device identifier;
FIG. 5 illustrates embodiments related to acquiring a device identifier and selecting a personal safety device for testing;
FIG. 6 illustrates embodiments related to selecting a personal safety device for testing;
FIG. 7 illustrates embodiments related to testing a further button of a personal safety device; and
FIG. 8 illustrates an example of a block diagram of an apparatus according to an embodiment.

DESCRIPTION OF EMBODIMENTS

[0007] The following embodiments are only examples. Although the specification may refer to "an" embodiment in several locations, this does not necessarily mean that each such reference is to the same embodiment(s), or that the feature only applies to a single embodiment. Single features of different embodiments may also be combined to provide other embodiments. Furthermore, words "comprising" and "including" should be understood as not limiting the described embodiments to consist of only those features that have been mentioned and such embodiments may contain also features/structures that have not been specifically mentioned.

[0008] Reference numbers, both in the description of the embodiments and in the claims, serve to illustrate the embodiments with reference to the drawings, without limiting it to these examples only.

[0009] The embodiments and features, if any, disclosed in the following description that do not fall under the scope of the independent claims are to be interpreted as examples useful for understanding various embodiments of the invention.

[0010] Let us study simultaneously FIG. 1 illustrating embodiments of a mobile testing device and a personal safety system, FIG. 2 illustrating embodiments of a personal safety system, and FIG. 3 illustrating embodiments of a method for testing a personal safety system.

[0011] Referring to FIG. 1, a personal safety device 116 to be tested has a device identifier and comprises an alarm button 118, and may comprise a further button 120, and a visual label 122. The mobile testing device 100 comprises a user interface, optionally including a graphical user interface 104. The user interface may be configured to display a graphical representation 106 of the personal safety device 116, a graphical representation 108 of the alarm button, and/or a graphical representation 110 of the further button. The mobile testing device receives alarm messages from the personal safety device over a direct radio link 114. Connections from the personal safety device and the mobile testing device to the server are also illustrated.

[0012] A personal safety system may comprise the mobile testing device 100, the personal safety device 116, and the server 124. Referring now to FIG. 2, a personal safety system comprises: one or more personal safety devices 206, 208, 210, 212; a server 224 configured to receive alarm messages from the one or more personal safety devices; and the mobile testing device 200. The personal safety system may comprise a plurality of personal safety devices, and/or one or more or a plurality of mobile testing devices 200, 202. The personal safety de-

vices 206, 208, 210, 212 may be assigned to different users, such as nurses or patients. The mobile testing device(s) may also be assigned to the different users. A user such as the nurse or the patient may thus have both the personal safety device and the mobile (testing) device at hand. The personal safety device may be wearable, e.g. a necklace or a wrist device. The direct radio link 226 between personal safety device 206 and mobile testing device 200 is also illustrated in FIG. 2.

[0013] Referring to FIG. 3, a method for testing a personal safety device comprises: acquiring 302, by a mobile testing device, a device identifier from the personal safety device; selecting 304, by the mobile testing device, the personal safety device for testing; sending 306, by the mobile testing device to a server configured to receive alarm messages from the personal safety device, a message indicating a test mode for testing the personal safety device, the message disabling alarming for the personal safety device at the server; receiving 308, by the mobile testing device during the testing, an alarm message from the personal safety device over a direct radio link between the mobile testing device and the personal safety device, wherein the alarm message from the personal safety device indicates depression of an alarm button of the personal safety device; and in response to receiving the alarm message, indicating 310 an alarm condition on a user interface of the mobile testing device.

[0014] The method starts at 300 and ends at 316. All of the operations are not strictly in chronological order in FIG. 3, and some of the operations may be performed simultaneously or in an order differing from the given ones. Other functions may also be executed between the operations or within the operations and other data exchanged between the operations. Some of the operations or part of the operations may also be left out or replaced by a corresponding operation or part of the operation. It should be noted that no special order of operations is required, except where necessary due to the logical requirements for the processing order.

[0015] It should further be clarified that although the depression of the alarm button serves as the means for triggering the alarm or for the testing described herein, technical means other than the button can be considered to stay within the equivalence. For example, a lever switch or a rotary switch or even a touch-sensitive pad can be implemented as an alarm switch but, conventionally, the button can be considered as the best mechanism for triggering the alarm.

[0016] In the context of the personal safety system, the mobile testing device 200 may perform the method with respect to any one or more of the personal safety devices 206, 208, 210, 212. Also, in the case that the personal safety system comprises a plurality of mobile testing devices, any one of the mobile testing devices 200, 202 may perform testing of any one of the personal safety devices. In such a case, a nurse may be able to use his/her mobile device to test an alarm function of a patient's (or another person's) personal safety device. In such a case, the mobile testing device does not necessarily forward alarm message(s) from the tested personal safety device to the server in case of a real alarm situation. Alternatively, a mobile testing device 200, 202 may be configured to only perform testing of personal safety devices associated with the mobile testing device. In such a case, the mobile testing device may forward the alarm message(s) received from the personal safety device to the server 124 in case of the real alarm situation and disable the forwarding during the testing. In FIG. 2, personal safety devices 206, 208 may be associated with mobile testing device 200, and personal safety devices 210, 212 may be associated with mobile testing device 202. In the following, testing specifically personal safety device 206 with mobile testing device 200 is often used as an example to highlight specific features of the following embodiments.

[0017] Testing of the personal safety device begins with the mobile testing device acquiring the device identifier (ID) of the personal safety device to be tested. The device ID may be a fixed-length or variable length code comprising numbers and/or letters and/or other characters, and it may comprise or correspond to a serial number of the personal safety device. The device ID may be comprised in the personal safety device. The device ID may be in a human-readable format to be acquired from the personal safety device by a user of the personal safety device. Alternatively or additionally, the device ID may be comprised in the personal safety device in a machine-readable format.

[0018] The personal safety device having the device ID is selected for testing by the mobile device. The device ID may be utilized to identify the personal safety device 206 and to distinguish it from other personal safety devices 208, 210, 212 that belong to the same personal safety system. Use of the device ID ensures that the correct personal safety device is selected for testing. Selecting the correct personal safety device 206 further ensures that the operation of the other personal safety devices 208, 210, 212 is not interrupted, and that they may function normally during the testing of the personal safety device 206.

[0019] In normal operation, the server 124, 224 is configured to receive alarm messages from the personal safety device 106, 206. As illustrated in FIG. 2, the server 224 is also configured to receive alarm messages from the other personal safety devices 208, 210, 212. An alarm message may be sent from the personal safety device by depression of an alarm button 118. In some embodiments, the alarm message is routed from the personal safety device to the server via a mobile testing device associated to the personal safety device, e.g. a mobile testing device and the personal safety device of the same user. However, the routing may be carried out via another route than via the mobile testing device in other embodiments. Upon receiving an alarm message from a personal safety device, the server may trigger an alarm for the personal safety device. The alarm message may

comprise the device identifier of the personal safety device. The alarm message may also comprise other information, such as location information of the personal safety device, provided with an indoor or outdoor positioning system, for example. Responders, such as an emergency responder or a nurse may acknowledge the alarm and proceed to help the user of the personal safety device. Alternatively or additionally, the alarm messages may be at least partially automatically processed by the server before alerting a responder.

[0020] The alarm messages may indicate a serious or life-threatening condition or emergency. However, details of the emergency are often not available for including in the alarm message, as the alarm message may be sent simply by pressing the alarm button 118 of the personal safety device 116. Thus all alarm messages may need to be treated with the same level of concern - with the expectation that the holder of the personal safety device may be in life-threatening danger. Further, a policy may exist for all alarm messages received at the server stating that they may need to be responded to within a specific time, or with a certain procedure. A false alarm may therefore result in a great deal of unnecessary work for the responders, and they may not be able to react to real alarms while handling the false alarm.

[0021] The mobile testing device 100, 200 sends a message that indicates a test mode of the personal safety device 106, 206 to the server 124, 224. The message may comprise the device ID of the personal safety device. The message disables alarming for the personal safety device at the server. If the user of the personal safety device uses the personal safety device to test the requesting of help or triggering an alarm while in the test mode, it may be ignored by the server. The server may also acknowledge the alarm message, but as alarming for the personal safety device is disabled, the responders may not be alerted. As alarms generated in the context of the test mode do not result in alarming at the server, the responders are not burdened by such false alarms.

[0022] The mobile testing device receives alarm messages from the personal safety device during the testing over a direct radio link 114, 226 between the mobile testing device and the personal safety device. The direct radio link may be a Bluetooth radio link. When the user presses the alarm button 118, the alarm message may be sent to both the mobile testing device and the server. The direct radio link allows for simpler operation and architecture of the personal safety system than circulating the alarm message via the server to the mobile testing device during the testing. Further loading of the server by the testing is also reduced by the direct radio link.

[0023] The server may maintain a record of the alarm messages received from the personal safety devices. The record may indicate whether the alarm message was received during test mode of the personal safety device. The mobile testing device may maintain a record of test mode messages sent to the server and of alarm messages received from the personal safety devices during test mode. Both of these individual records allow for monitoring a testing status of individual personal safety devices. The mobile testing device may be configured to alert its user to carry out testing for a personal safety device, if a time period since a previous testing of the personal safety device or alarm message received from the personal safety device during testing exceeds a testing frequency threshold. The testing frequency threshold may be one week or one month, for example.

[0024] Upon receiving the alarm message, the mobile testing device indicates an alarm condition on a user interface of the mobile testing device. The user interface may comprise a display or a graphical user interface 104, or a speaker, for example, and the indicating may comprise displaying a message or an image on the graphical user interface, or playing a sound on the speaker. The indicating may provide information to the user that the personal safety device and its alarm button 118 are functioning correctly.

[0025] Some advantages of the above solution may be highlighted by comparing to an alternative approach, where a stationary testing station is provided to the users of the personal safety devices. The testing station is at a specific location, such as in one of the rooms of a hospital, and the users must travel to the testing station to test their personal safety devices. False alarms may be avoided e. g. by ignoring requests generated by the personal safety devices in the vicinity of the testing station, i.e. when the testing is carried out at the testing station. However, the approach has many limitations, especially when the users of the personal safety devices are distributed over a large area, or simply reside far from the testing station.

[0026] The advantages of the solution include the ability of the user to test their personal safety device using the mobile testing device regardless of time or location. The mobile testing device may be portable and thus carried by the user to any location. The user may not be bound to a stationary testing station, but instead may carry the mobile testing device with them. Each user having a personal safety device may have their own mobile testing device. The user may test their personal safety device at any time they wish to do so. A smartphone or similar may also act as the mobile testing device and perform the method of FIG. 3 and related embodiments for testing the personal safety device. The method may also be implemented as an application, such as a smartphone application, which may be readily accessible to all users who already have a smartphone. Testing of the personal safety devices may therefore be easier and better accessible to users of the personal safety devices.

[0027] FIG. 4 illustrates embodiments related to acquiring the device ID. The device ID may be comprised in a machine-readable label of the personal safety device. In an embodiment, the mobile testing device comprises a camera 112, illustrated in FIG. 1, and the acquiring comprises scanning 400, with the camera, a visual label 122 of the personal safety device to obtain the de-

vice identifier. The visual label may be both human- and machine-readable or comprise both a human-readable part and a machine-readable part, which may or may not be overlapping, allowing for both the human user and the mobile testing device to identify the correct personal safety device for testing. This advantage is relevant especially in a situation where the user possesses a plurality of personal safety devices and wishes to test each one of them individually, allowing for the user to identify the personal safety device to be tested. The mobile testing device may also comprise a light source for illuminating the visual label in dark conditions.

[0028] In an embodiment, the visual label comprises a linear or matrix barcode, and the acquiring further comprises decoding 402 the barcode by the mobile testing device to obtain the device identifier. The matrix barcode may be a Quick Response (QR) code. In addition to being machine-readable, the barcode may comprise a human-readable string or sequence of e.g. numbers for verifying, by the user, that the correct personal safety device is to be selected.

[0029] FIG. 5 illustrates embodiments related to acquiring the device ID, and selecting the personal safety device for testing. In an embodiment, the acquiring of the device identifier comprises receiving 500 the device identifier in a radio signal continuously or periodically transmitted by the personal safety device. The radio signal may be periodically transmitted in a regular or irregular manner. The radio signal may be received via the same direct radio link 114 as the alarm message. The radio signal may be a Bluetooth signal. The personal safety device may transmit the radio signal continuously, or periodically, possibly at certain intervals. The mobile testing device may receive the radio signal continuously, or it may receive the radio signal periodically. The receiving of the radio signal may also be triggered by an event, such as a user interaction on the user interface of the mobile testing device. The acquiring by receiving the radio signal may also not require any user actions, as the mobile testing device may receive the device ID from the personal safety device as long as it is within range of the radio signal transmitted by the personal safety device.

[0030] In an embodiment, the method further comprises: determining 502 a received signal strength indication, RSSI, value of the radio signal by the mobile device; and selecting 504, by the mobile device, the personal safety device for testing if the RSSI value is above a predetermined RSSI threshold. The RSSI value may indicate a strength of the radio signal received by the mobile testing device.

[0031] The RSSI value may also indicate a proximity of the personal safety device to the mobile testing device. A first RSSI value may indicate a close proximity of the personal safety device to the mobile testing device. The close proximity may refer to a distance of about 0.5 centimetres (cm) between the personal safety device and the mobile testing device, for example. A second RSSI value that is lower that the first RSSI value may indicate that the personal safety device and the mobile testing device are further away from each other, such as that they are 1 metre apart.

[0032] The predetermined RSSI threshold may correspond to the first RSSI value, or to the second RSSI value, or to another RSSI value. The predetermined RSSI threshold may correspond to a RSSI value that indicates a very close proximity of the personal safety device to the mobile testing device, such as a distance of about 0.1 cm between the personal safety device and the mobile testing device. The mobile testing device may be configured to select the personal safety device for testing based on the proximity of the personal safety device to the mobile testing device, or if the personal safety device is in very close proximity of the mobile testing device. The proximity may be determined based on the RSSI value as described above. The very close proximity may in practice correspond to the personal safety device and the mobile testing device touching or at least nearly touching each other.

[0033] Advantages of the above embodiments include that the user may control the testing by bringing the mobile testing device within range of the radio signal transmitted by the personal safety device, and/or by adjusting the proximity of the personal safety device to the mobile testing device. In an embodiment wherein the predetermined RSSI threshold corresponds to a very close proximity of the personal safety device to the mobile testing device, such as a distance of about 0.1 cm between the personal safety device and the mobile testing device, the user may control the selecting by lightly tapping the mobile testing device with the personal safety device, by placing the personal safety device against the mobile testing device, or otherwise bringing the personal safety device to very close proximity to the mobile testing device. However, it is noted that user actions are not necessarily required in the above embodiments; the mobile testing device may autonomously select the personal safety device for testing using the RSSI value, and the user may not be required to manually enter the device ID to the mobile testing device to carry out the testing, for example. The embodiments do however present the user with opportunities to control the testing.

[0034] In an embodiment illustrated in FIG. 6, the selecting comprises outputting 600 the device identifier and/or characteristic information related to the device identifier on the user interface. The device identifier and/or the characteristic information may be displayed on the (graphical) user interface 102, 104, for example. The characteristic information may comprise a name of the person the personal safety device is assigned to, an owner of the personal safety device, such as an employer of the person the device is assigned to, and a location wherein the personal safety device is intended to be used, such as certain hospital, for example. The user may observe the device ID and/or the characteristic information from the user interface to confirm that the correct personal safety device has been selected for testing.

[0035] FIG. 6 also illustrates an embodiment wherein the selecting further comprises receiving 602 a user input via the user interface to select the personal safety device for testing. The user interface 102 may comprise a touch screen, touch pad, button, microphone, and/or other means for receiving the user input. The user is thus able to affect the selecting; to pick the personal safety device for testing, or to confirm a selection made by the mobile testing device. The mobile testing device may also present an option to abort the selecting to the user to account for the possibility that an incorrect personal safety device is about to be selected for testing.

[0036] The above embodiments have further advantages when combined with one or more of the other embodiments related to the acquiring of the device ID and/or selecting the personal safety device for testing. The outputting may communicate a success of the method, up to the point of the selecting, to the user. The user is also given an opportunity to verify that the correct device has been selected by the scanning of the visual label, decoding of the barcode, receiving of the radio signal, and/or determining of the RSSI value, for example. The user may compare the device ID and/or the characteristic information to the visual label, and the visual label may also comprise at least some of the characteristic information. The user may also perform the comparison against their own knowledge, e.g. in the case that they are testing their own assigned personal safety device. However, specific advantages are provided in the case that multiple personal safety devices are available for testing, as the selection of the correct personal safety device for the testing may be confirmed, and normal operation of the other personal safety devices may not be interrupted.

[0037] The user interface may be configured to display a graphical representation 106 of the personal safety device, as illustrated in FIG. 1. In an embodiment, the user interface is configured to display a graphical representation 108 of the alarm button, and said indicating the alarm condition comprises altering 312 the graphical representation of the alarm button. For example, before receiving the alarm message from the personal safety device, the graphical representation 108 of the alarm button may be filled in with a red colour. When the alarm message is received, the alarm condition may be indicated by altering the colour of the graphical representation 108 of the alarm button from red to green, for example. The indicating and altering may occur in real-time or almost real-time with the receiving of the alarm message. The user may be provided with rapid testing results that are easy to understand because of the altering of the graphical representation of the alarm button. Ease of understanding is advantageous in challenging conditions, especially when the user is of a patient with a lowered mental capacity, or a nurse working in a high-stress environment, for example.

[0038] In addition to the alarm button, the personal safety device may comprise a further button 120. The further button may be configured for other purposes than for sending alarm messages, such to cancel a previously sent alarm message. The further button may operate in a similar way as the alarm button in that a button press message may be sent upon depression of the further button. In another embodiment, the further button 120 is an alarm button that triggers a low-priority alarm or a request for attention. For example, it may be linked to a call for assistance from medical staff or from a colleague. In some cases, the further button may have no function configured thereto.

[0039] FIG. 7 illustrates an embodiment wherein the method further comprises: receiving 700, by the mobile testing device during the testing, a button press message from the personal safety device over the direct radio link between the mobile testing device and the personal safety device, wherein the button press message from the personal safety device indicates depression of a further button of the personal safety device; and in response to receiving the button press message, indicating 702 a button press on the user interface of the mobile testing device. The further button may thus be tested in a similar way as the alarm button.

[0040] In an embodiment, the user interface is configured to display a graphical representation of the further button, and said indicating the button press comprises altering 704 the graphical representation of the further button. In addition to the advantages described above, altering the graphical representation of the further button helps distinguish the indicating 702 of the button press from the indicating 310 of the alarm condition.

[0041] The above embodiments may also extended for one or more further buttons, or other user input element(s) that are comprised in the personal safety device. The personal safety device may also comprise a plurality of alarm buttons, each of which may be tested according to the above embodiments.

[0042] When the testing is completed, the test mode may be ended to resume normal operation of the personal safety device. In an embodiment, the method further comprises: sending 314, by the mobile testing device to the server, a message indicating an end of the test mode of the personal safety device, the message enabling alarming for the personal safety device at the server. The sending 314 may be triggered by a user input or interaction on the user interface. Alternatively or additionally, the sending may be triggered by a timer. The mobile testing device may be configured to start the timer to measure a time beginning from the acquiring, selecting, sending, receiving, indicating, or another point in time at a beginning of the testing. When the time exceeds or is above a predetermined testing time threshold, the message indicating the end of the test mode may be sent. The predetermined testing time threshold may be 5 minutes, for example. This way, the test mode may be ended even if the user forgets to do so, and normal operation of the personal safety device may be resumed.

[0043] According to an aspect, a mobile testing device

100 for testing a personal safety device 116 comprises means for: acquiring a device identifier from the personal safety device; selecting the personal safety device for testing; sending, to a server 124 configured to receive alarm messages from the personal safety device, a message indicating a test mode for testing the personal safety device, the message disabling alarming for the personal safety device at the server; receiving, during the testing, an alarm message from the personal safety device over a direct radio link 114 between the mobile testing device and the personal safety device, wherein the alarm message from the personal safety device indicates depression of an alarm button 118 of the personal safety device; and in response to receiving the alarm message, indicating an alarm condition on a user interface 102 of the mobile testing device.

[0044] In embodiments, the mobile testing device comprises means for performing the method of claim 1 or any one of the embodiments thereof described above.

[0045] According to an aspect, a computer program product embodied on a distribution medium readable by a computer and comprising computer program instructions that, when executed by the computer, cause the computer to carry out a computer process in a mobile testing device, comprising: acquiring a device identifier from a personal safety device; selecting the personal safety device for testing; sending, to a server configured to receive alarm messages from the personal safety device, a message indicating a test mode for testing the personal safety device, the message disabling alarming for the personal safety device at the server; receiving, during the testing, an alarm message from the personal safety device over a direct radio link between the mobile testing device and the personal safety device, wherein the alarm message from the personal safety device indicates depression of an alarm button of the personal safety device; and in response to receiving the alarm message, indicating an alarm condition on a user interface of the mobile testing device.

[0046] FIG. 8 illustrates a block diagram of an apparatus according to an embodiment, comprising a processing system configured to perform the method of claim 1 or any one of the embodiments thereof described above. The apparatus may be the mobile testing device 100. The processing system may comprise at least one processor 10 and at least one memory 20. FIG. 8 also illustrates the computer program product 18 embodied on the distribution medium 30.

[0047] The apparatus may comprise a communication circuitry 32 connected to the processor 10. The communications circuitry may provide or be comprised in the means for the acquiring, sending, and/or receiving, for example. The communication circuitry may comprise hardware and software suitable for supporting Bluetooth® communication protocol such as Bluetooth Smart specifications. It should be appreciated that other communication protocols are equivalent solutions as long as they are suitable for establishing the direct radio link with the personal safety device(s) 206, 208, 210, 212. The communication circuitry may comprise a radio modem and appropriate radio circuitries for establishing a communication connection with the server computer. Suitable radio protocols may include IEEE 802.11-based protocols or cellular communication protocols. The processor 10 may use the communication circuitry 32 to transmit and receive frames or data according to the supported wireless communication protocol. The frames may carry a payload data comprising the above-described messages, such as the alarm message. The memory 20 may store the computer program product 18 defining the computer program instructions for carrying out the method of FIG. 3 or any one of the embodiments thereof.

[0048] As used in this application, the term 'circuitry' refers to all of the following: (a) hardware-only circuit implementations, such as implementations in only analog and/or digital circuitry, and (b) combinations of circuits and software (and/or firmware), such as (as applicable): (i) a combination of processor(s) or (ii) portions of processor(s)/software including digital signal processor(s), software, and memory(ies) that work together to cause an apparatus to perform various functions, and (c) circuits, such as a microprocessor(s) or a portion of a microprocessor(s), that require software or firmware for operation, even if the software or firmware is not physically present. This definition of 'circuitry' applies to all uses of this term in this application. As a further example, as used in this application, the term 'circuitry' would also cover an implementation of merely a processor (or multiple processors) or a portion of a processor and its (or their) accompanying software and/or firmware. The term 'circuitry' would also cover, for example and if applicable to the particular element, a baseband integrated circuit or applications processor integrated circuit for a mobile phone or a similar integrated circuit in a server, a cellular network de-vice, or another network device.

[0049] In an embodiment, at least some of the processes described in connection with FIG. 3 to FIG. 7 may be carried out by an apparatus comprising corresponding means for carrying out at least some of the described processes, such as the acquiring, selecting, sending, receiving, and/or indicating, for example. Some example means for carrying out the processes may include at least one of the following: detector such as the camera 112 or the like, processor (including dual-core and multiple-core processors), digital signal processor, controller, receiver, transmitter, encoder, decoder, memory, RAM, ROM, software, firmware, display, user interface, display circuitry, user interface circuitry, user interface software, display software, circuit, and circuitry. In an embodiment, the at least one processor 10, the memory 20, and the computer program code 18 form processing means or comprises one or more computer program code portions for carrying out one or more operations according to any one of the embodiments of FIG. 3 to FIG. 7 or operations thereof.

[0050] According to yet another embodiment, the ap-

paratus carrying out the embodiments comprises a circuitry including at least one processor and at least one memory including computer program code. When activated, the circuitry causes the apparatus to perform at least some of the functionalities according to any one of the embodiments of FIG. 3 to FIG. 7, or operations thereof.

[0051] The techniques and methods described herein may be implemented by various means. For example, these techniques may be implemented in hardware (one or more devices), firmware (one or more devices), software (one or more modules), or combinations thereof. For a hardware implementation, the apparatus(es) of embodiments may be implemented within one or more application-specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, microcontrollers, microprocessors, other electronic units designed to perform the functions described herein, or a combination thereof. For firmware or software, the implementation can be carried out through modules of at least one chipset (e.g. procedures, functions, and so on) that perform the functions described herein. The software codes may be stored in a memory unit and executed by processors. The memory unit may be implemented within the processor or externally to the processor. In the latter case, it can be communicatively coupled to the processor via various means, as is known in the art. Additionally, the components of the systems described herein may be rearranged and/or complemented by additional components in order to facilitate the achievements of the various aspects, etc., described with regard thereto, and they are not limited to the precise configurations set forth in the given figures, as will be appreciated by one skilled in the art.

[0052] Embodiments as described may also be carried out in the form of a computer process defined by a computer program or portions thereof. Embodiments of the methods described in connection with FIG. 3 to FIG. 7 may be carried out by executing at least one portion of a computer program comprising corresponding instructions. The computer program may be in source code form, object code form, or in some intermediate form, and it may be stored in some sort of carrier, which may be any entity or device capable of carrying the program. For example, the computer program 18 may be stored on a computer program distribution medium 30 readable by a computer or a processor 10. The computer program medium may be, for example but not limited to, a record medium, computer memory, read-only memory, electrical carrier signal, telecommunications signal, and software distribution package, for example. The computer program medium may be a non-transitory medium. Coding of software for carrying out the embodiments as shown and described is well within the scope of a person of ordinary skill in the art.

[0053] Even though the invention has been described with reference to one or more embodiments according to the accompanying drawings, it is clear that the invention is not restricted thereto but may be modified in several ways within the scope of the appended claims. All words and expressions should be interpreted broadly, and they are intended to illustrate, not to restrict, the embodiments. It will be obvious to a person skilled in the art that, as technology advances, the inventive concept may be implemented in various ways.

Claims

1. A method for testing a personal safety device, the method comprising:

   acquiring (302), by a mobile testing device, a device identifier from the personal safety device;
   selecting (304), by the mobile testing device, the personal safety device for testing;
   sending (306), by the mobile testing device to a server configured to receive alarm messages from the personal safety device, a message indicating a test mode for testing the personal safety device, the message disabling alarming for the personal safety device at the server;
   receiving (308), by the mobile testing device during the testing, an alarm message from the personal safety device over a direct radio link between the mobile testing device and the personal safety device, wherein the alarm message from the personal safety device indicates depression of an alarm button of the personal safety device; and
   in response to receiving the alarm message, indicating (310) an alarm condition on a user interface of the mobile testing device.

2. The method of claim 1, wherein the mobile testing device comprises a camera (112), and wherein the acquiring comprises scanning (400), with the camera, a visual label of the personal safety device to obtain the device identifier.

3. The method of claim 2, wherein the visual label comprises a linear or matrix barcode, and wherein the acquiring further comprises decoding (402) the barcode by the mobile testing device to obtain the device identifier.

4. The method of any preceding claim, wherein the acquiring of the device identifier comprises receiving (500) the device identifier in a radio signal continuously or periodically transmitted by the personal safety device.

5. The method of claim 4, wherein the selecting comprises:

determining (502) a received signal strength indication, RSSI, value of the radio signal by the mobile device; and
selecting (504), by the mobile device, the personal safety device for testing if the RSSI value is above a predetermined RSSI threshold.

6. The method of any preceding claim, wherein the selecting comprises:
outputting (600) the device identifier and/or characteristic information related to the device identifier on the user interface.

7. The method of claim 6, wherein the selecting further comprises:
receiving (602) a user input via the user interface to select the personal safety device for testing.

8. The method of any preceding claim, further comprising:
sending (314), by the mobile testing device to the server, a message indicating an end of the test mode of the personal safety device, the message enabling alarming for the personal safety device at the server.

9. The method of any preceding claim, wherein the user interface is configured to display a graphical representation (108) of the alarm button, and wherein said indicating the alarm condition comprises altering (312) the graphical representation of the alarm button.

10. The method of any preceding claim, further comprising:

receiving (700), by the mobile testing device during the testing, a button press message from the personal safety device over the direct radio link between the mobile testing device and the personal safety device, wherein the button press message from the personal safety device indicates depression of a further button (120) of the personal safety device; and
in response to receiving the button press message, indicating (702) a button press on the user interface of the mobile testing device.

11. The method of claim 10, wherein the user interface is configured to display a graphical representation (110) of the further button, and wherein said indicating the button press comprises altering (704) the graphical representation of the further button.

12. A mobile testing device (100) for testing a personal safety device (116), the device comprising means for:

acquiring a device identifier from the personal safety device;
selecting the personal safety device for testing;
sending, to a server (124) configured to receive alarm messages from the personal safety device, a message indicating a test mode for testing the personal safety device, the message disabling alarming for the personal safety device at the server;
receiving, during the testing, an alarm message from the personal safety device over a direct radio link (114) between the mobile testing device and the personal safety device, wherein the alarm message from the personal safety device indicates depression of an alarm button (108) of the personal safety device; and
in response to receiving the alarm message, indicating an alarm condition on a user interface (102) of the mobile testing device.

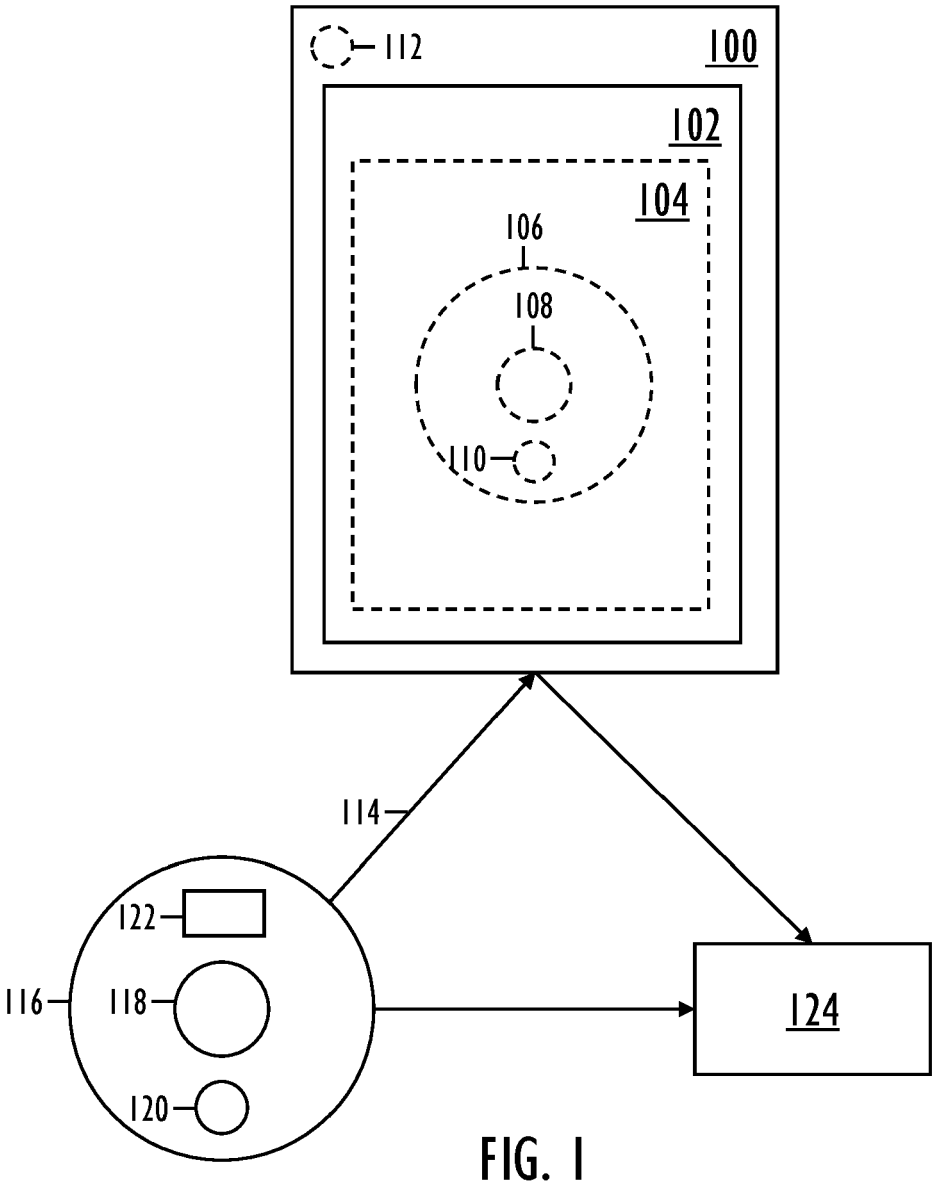
13. The mobile testing device of claim 12, comprising means for performing the method of any preceding claim 2-11.

14. A personal safety system comprising:

one or more personal safety devices (206, 208, 210, 212);
a server (224) configured to receive alarm messages from the one or more personal safety devices; and
the mobile testing device (200) of claim 12 or 13.

15. A computer program product (18) embodied on a distribution medium (30) readable by a computer and comprising computer program instructions that, when executed by the computer, cause the computer to carry out a computer process in a mobile testing device, comprising:

acquiring a device identifier from a personal safety device;
selecting the personal safety device for testing;
sending, to a server configured to receive alarm messages from the personal safety device, a message indicating a test mode for testing the personal safety device, the message disabling alarming for the personal safety device at the server;
receiving, during the testing, an alarm message from the personal safety device over a direct radio link between the mobile testing device and the personal safety device, wherein the alarm message from the personal safety device indicates depression of an alarm button of the personal safety device; and
in response to receiving the alarm message, indicating an alarm condition on a user interface of the mobile testing device.


112
100
102
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106
108
110
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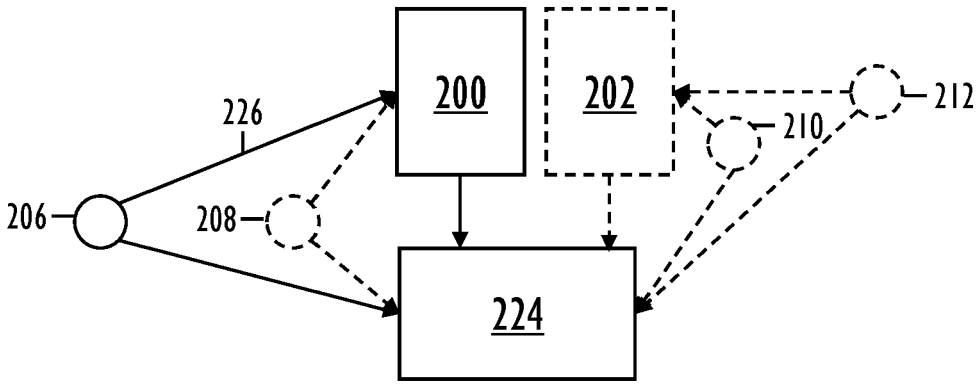
122
116
118
120
124

FIG. 1


200
202
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210
226
206
208
224

FIG. 2

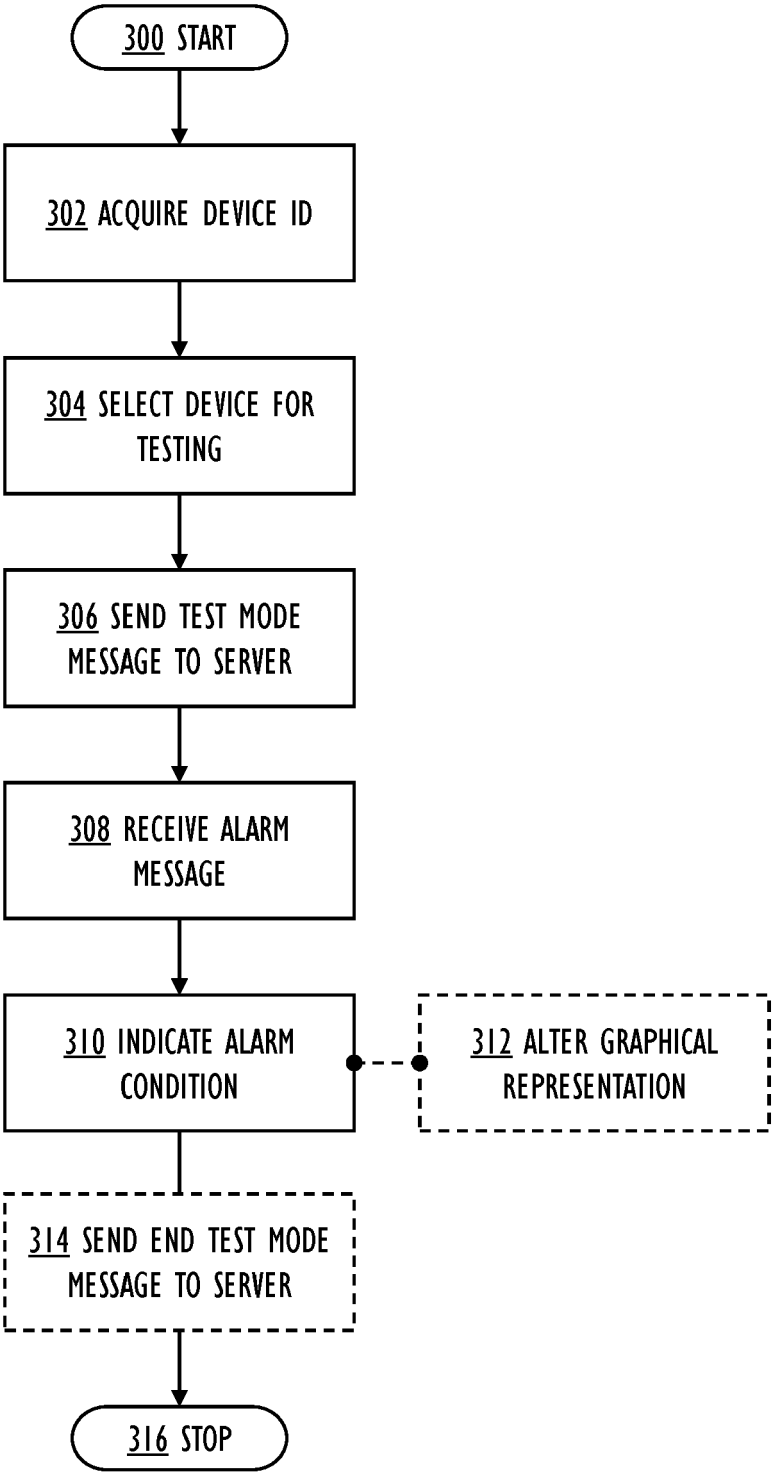
300 START
302 ACQUIRE DEVICE ID
304 SELECT DEVICE FOR TESTING
306 SEND TEST MODE MESSAGE TO SERVER
308 RECEIVE ALARM MESSAGE
310 INDICATE ALARM CONDITION
312 ALTER GRAPHICAL REPRESENTATION
314 SEND END TEST MODE MESSAGE TO SERVER
316 STOP

FIG. 3

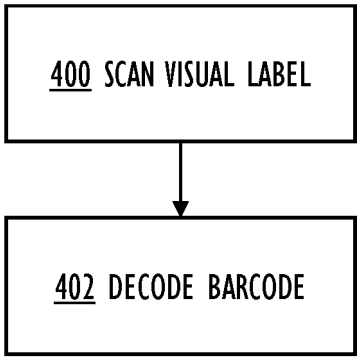
400 SCAN VISUAL LABEL
402 DECODE BARCODE

FIG. 4

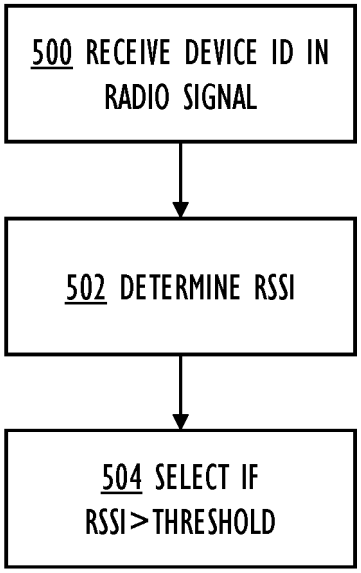
500 RECEIVE DEVICE ID IN RADIO SIGNAL
502 DETERMINE RSSI
504 SELECT IF RSSI>THRESHOLD

FIG. 5

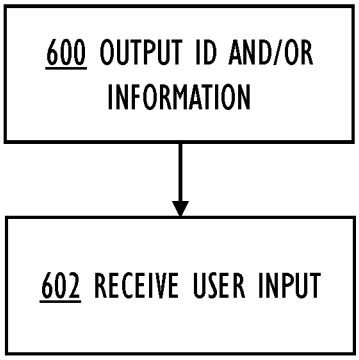

FIG. 6

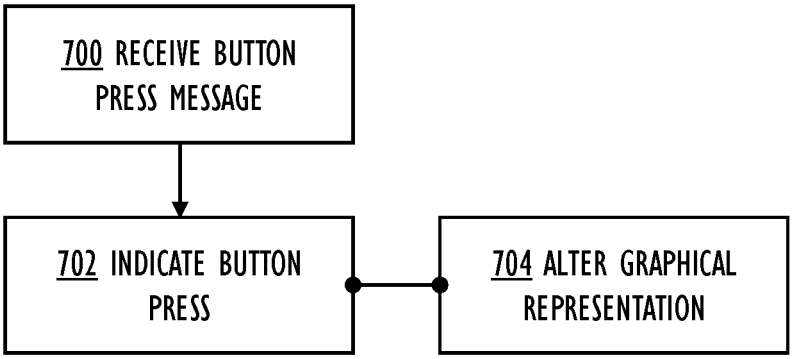

FIG. 7

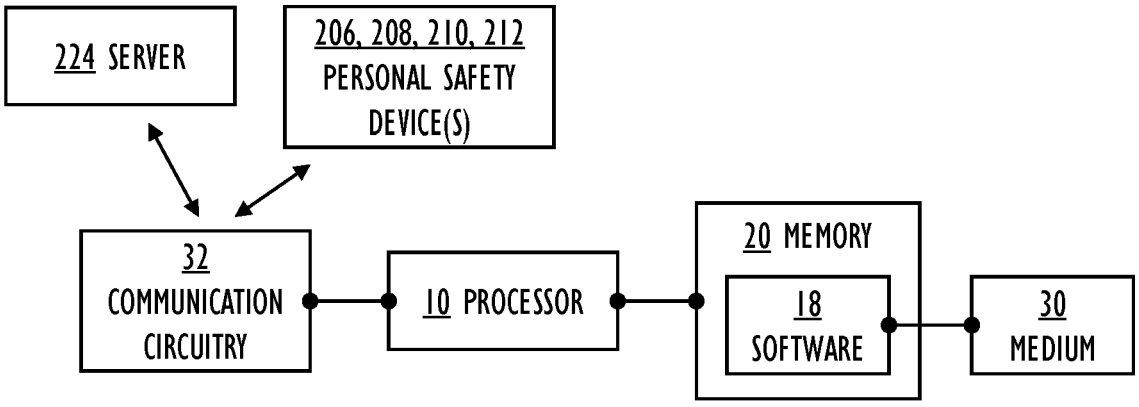

FIG. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 21 19 0758

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 4 908 602 A (REICH RICHARD M [US] ET AL) 13 March 1990 (1990-03-13) * column 4, line 60 - column 5, line 27; figure 1 *	1-15	INV. G08B25/01 G08B29/12
A	US 2013/147620 A1 (BECKER DONALD [US] ET AL) 13 June 2013 (2013-06-13) * the whole document *	1-15	
A	US 2014/199946 A1 (FLIPPO ROBERT [US] ET AL) 17 July 2014 (2014-07-17) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC) G08B

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 January 2022	Kurzbauer, Werner

CATEGORY OF CITED DOCUMENTS

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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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 19 0758

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20-01-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4908602 A	13-03-1990	NONE	
US 2013147620 A1	13-06-2013	EP 2791927 A1	22-10-2014
		ES 2729963 T3	07-11-2019
		US 2013147620 A1	13-06-2013
		WO 2013090265 A1	20-06-2013
US 2014199946 A1	17-07-2014	NONE	

EPO FORM P0459

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