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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) An apparatus for and method of monitoring persons

(57) An apparatus for monitoring a person, characterised by comprising means (4) for generating a challenge which is delivered to a person (12) being monitored, and for generating an alarm if no response is received within a preset time period or if the response is not correct.

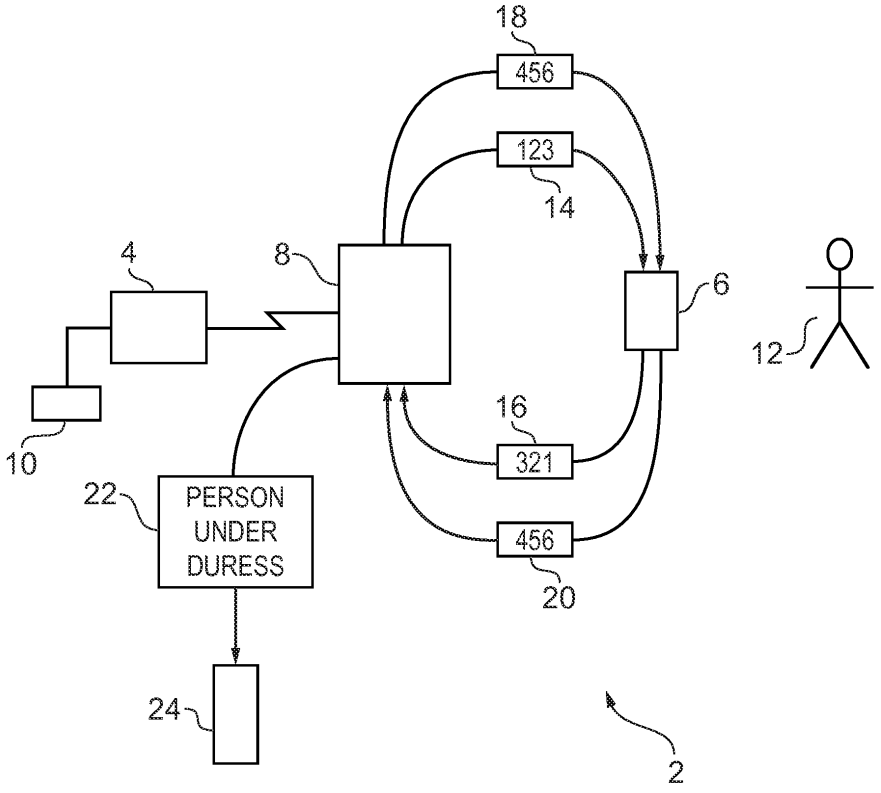

FIG. 1

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Description

Field of the Invention

[0001] The present invention relates to an apparatus for and a method of monitoring persons.

Background to the Invention

[0002] There are a number of industries which require workers to undertake their tasks away from fellow workers. When this work is conducted in remote places, or at antisocial hours, there is a problem in ensuring that an alarm would be raised if the lone worker had an accident. There are a number of known solutions available for this type of situation which involve placing monitors on the body of the worker to detect if there is no movement over a period of time, or to detect if the worker is lying down. This data may, for example, be used to infer that a worker is unconscious. These types of systems are typically called "man down devices" and in the event of a lack of movement while lying down being detected then the device is capable of sending an alarm signal. Another solution in regular use is for a remote colleague to periodically telephone the lone worker to ask if he or she is alright.

[0003] Some lone or remote workers may also work in situations where they may be placed under duress or taken hostage. Examples of this type of worker are psychiatric nurses visiting patients in the community, and security guards. For these types of worker neither a man down alarm nor a colleague phone call may be sufficient to indicate a duress or hostage situation as the lone worker will be made to respond appropriately. Further examples of personnel who may benefit from monitoring are other vulnerable persons such as people travelling alone for long periods, whether on business or for pleasure.

Summary of the Invention

[0004] According to the first aspect of the invention there is provided an apparatus for monitoring a person, characterised by means for generating a challenge which is delivered to a person being monitored and for generating an alarm if no response is received within a preset time period or if the response is not correct.

[0005] It is thus possible to provide an automatic system which periodically communicates with the lone worker or other vulnerable person. The system requires the person being monitored to undertake a simple task to ensure that they are alive or well. The system monitors for a response for the person being monitored and, provided that the response is in an expected format the system can record the fact that the person being monitored is responsive and safe. However, such a system can also produce a covert alarm if the person being monitored is subject to duress. Under such circumstances the person being monitored may provide an incorrect response to the challenge, or may provide an "emergency" or "duress" response to the challenge such that they can signal to the system that they are under duress or require assistance and consequently an appropriate alarm can be raised.

[0006] Preferably the person being monitored is given a predetermined time in which to provide a correct response to the system to indicate that their status is "satisfactory" which can imply that they are acceptably safe and acceptably well.

[0007] Preferably the challenge is a random sequence.

[0008] Because the person being monitored responds to the randomly generated challenge in accordance with the rules known only to themselves, or to only a few select individuals, then that person being monitored can indicate whether their situation is satisfactory or whether they are in a duress situation, and if they are in a duress situation the person placing them under duress has no way of knowing which response the person being monitored is giving. Consequently, a third party placing the person being monitored under duress would not be able to respond on behalf of the person being monitored and would not know if the person being monitored had given a satisfactory response or a duress response. Thus safety of vulnerable workers is increased.

[0009] Advantageously the challenge in response is made using existing telecommunications infrastructure. Thus, for example, the challenge and response may be in the form a text or SMS message sent to, for example, a mobile telephone connected to a mobile telephone network. The telephone of the person being monitored may be capable of transmitting its position, for example by reference to the Global Positioning System, or the position may be determined by network operator parameters. The location of a mobile device might be achieved via triangulation, time to propagate the received signal, or simply coverage area of the mast handling the call. This can provide useful information if, for example, the person being monitored has moved from their expected path, perhaps because of an abduction. Similarly, failure of the person to move when movement is expected may indicate injury or a hostage situation.

[0010] Where a person is expected to move along a route, a number of communication devices may be located along the route that the person being monitored has to proceed. A monitoring communication, comprising a challenge needing a response, can then be sent to each device in turn or each successive device along the route and the person being monitored can respond appropriately from each communication device as they reach it. In this way the progress of the person along the route and their status, e.g. whether their status is satisfactory or whether they are under duress, or whether they have failed to arrive, can be monitored.

[0011] According to a second aspect of the present invention there is provided a method for monitoring a person, comprising the steps of:

1) generating a challenge to be sent to a person being monitored whereby the person being monitored knows how to respond to the challenge;
2) sending the challenge;
3) monitoring for receipt of a response to the challenge; and
4) raising an alert if a response is not received within a predetermined time or if the response is incorrect or if the response indicates a duress situation.

Brief Summary of the Drawing

[0012] The present invention will now be described with reference to the attached drawing which is a schematic drawing showing a personnel monitoring system constituting an embodiment of the present invention.

Description of Preferred Embodiment of the Invention

[0013] Figure 1 illustrates a monitoring system, generally designated 2 for monitoring a person. The system comprises a computer 4 arranged to send text messages to and receive text messages from a mobile phone 6 carried by a person being monitored 12. Communication between the computer 4 and the mobile phone 6 is made via a telephone communications infrastructure, generally designated 8. The computer 4 may be a conventional computer which need not be described in detail here. A program within the computer 4 may have access to a database 10 which contains details of the person or persons to be monitored. These details include the mobile telephone number of the or each person 12, the chosen format for their response to indicate that their condition is satisfactory and/or to indicate that they are in a duress situation, and third party contact details, for example phone number or e-mail address, to which an alarm message may be sent indicating that the person is under duress.

[0014] The database further contains an indication of the frequency or times at which a monitoring cycle comprising a challenge and response is to be performed, and may optionally contain logs of preceding challenge and response sequences. The database may also indicate how long a person has to respond and/or whether a repeat of the challenge should be made.

[0015] A person being monitored 12 carries their mobile phone 6. Their mobile phone is capable of receiving and sending text messages.

[0016] Periodically the computer 4 checks the database 10 to determine if a monitoring communication is required in respect of the person 12. If the computer 4 determines that it is time to send a monitoring message to the person 12 it generates a random number, in this example 123, and this is sent as a text message 14 via the telecommunications network to the mobile phone 6 of the person being monitored. The computer also starts a timer to time a period in which the response should be received.

[0017] Upon receipt of the text message by the mobile phone 6, the person being monitored 12 knows the required response in order to indicate that their situation is satisfactory. The "satisfactory" response may, for example, be to send a text message back, designated 16, in which the number sequence is reversed. This is then conveyed by the telecommunications network to the computer 8 which can examine the database, compare the response with the rules for responding and determine that the response indicates that the person is satisfactory. As the response is satisfactory, and has been received before the end of a timeout period, then the computer system 4 takes no further action other than to schedule the next monitoring event for that person.

[0018] Suppose, at a later time, that the computer 4 sends another periodic monitoring message 18 to the mobile device 6 of the person 12 being monitored. The message is randomly generated, and in this example is "456". Suppose now that the person 12 being monitored is under duress, for example having been taken hostage, and his captor tells him to respond appropriately to the message. The person 12 being monitored knows the required response to indicate a duress situation, which in this example may be to repeat the number sequence exactly as received. He therefore sends a text message 20 back to the computer 4 via the telecommunications network 8. The person holding the person being monitored 12 does not know the correct reply and hence cannot tell whether this was a duress message or a satisfactory message. Upon receipt of the message indicating that the person 12 is under duress the computer 4 examines the database, notes that the message is not satisfactory, and further notes that it corresponds the duress message, and therefore opens the contact details for the third party to which an alert should be sent. The computer 4 then sends an alert message 22 to a communications terminal, such as a mobile phone 24, of a person designated in the database.

[0019] The computer 4 may also start a timer when each challenge 14 or 18 is sent, and may check to see whether a response has been returned by the end of a period counted by the timer. If no response has been received then an alert message may also be sent to the device 24 indicating the absence of a satisfactory response from the person 12.

[0020] It is thus possible to provide a robust, simple and inexpensive monitoring system which can be readily deployed using available technology.

Claims

1. An apparatus for monitoring a person, **characterised by** comprising means (4) for generating a challenge which is delivered to a person (12) being monitored, and for generating an alarm if no response is received within a preset time period or if the response is not correct.

2. An apparatus as claimed in claim 1, **characterised in that** the means for generating a challenge generates a random challenge.

3. An apparatus as claimed in claim 1 or 2, **characterised in that** the correct response to the challenge is known by the person being monitored, and the means for generating the challenge can record a response made by a person being monitored.

4. An apparatus as claimed in any of the preceding claims in which the person being monitored can respond to the challenge with a response indicating that they need help.

5. An apparatus as claimed in any of the preceding claims **characterised in that** the means for generating a challenge includes a data processor (4) adapted to record the frequency at which challenges are to be issued to a person being monitored, and the contact details of an entity to which an alarm message is to be sent.

6. An apparatus as claimed in any of the preceding claims, in which a record of the time at which a previous challenge and response is maintained.

7. An apparatus as claimed in any of the preceding claims, in which the challenge is issued over a telecommunications network (8).

8. An apparatus as claimed in claim 7 in which the challenge is sent as a text message.

9. An apparatus as claimed in claim 7 or 8, in which a person being monitored has a mobile device (6) for sending a response, and the position of that device can be determined.

10. An apparatus as claimed in any of the preceding claims, in which a plurality of communication devices are positioned along a route that the person being monitored is travelling, and a person being monitored responds to a challenge as they reach each device along the route.

11. A method of monitoring a person, comprising the steps of:

generating a challenge to be sent to a person being monitored, whereby the person being monitored knows how to respond to the challenge;
sending the challenge;
monitoring for receipt of a response to the challenge; and
raising an alert if a response is not received within a preset time period or if a response is incorrect or indicates duress.

12. A method as claimed in claim 11, **characterised in that** a challenge is generated in accordance with a schedule.

13. A method as claimed in claim 11 or 12 in which the challenge is sent to a mobile telecommunications device associated with the person being monitored.

14. A method as claimed in any of claims 11 to 13 in which the challenge is randomly generated, but the rules for responding correctly are known to the person being monitored such that they can calculate and send a correct response to the challenge.

15. A method as claimed in any of claims 11 to 14 in which the person being monitored can send an incorrect response or a duress response to cause an alert to be raised.

Amended claims in accordance with Rule 137(2) EPC.

1. An apparatus for monitoring a person, comprising means (4) for generating a challenge which is delivered to a person (12) being monitored, and for generating an alarm if no response is received within a preset time period or if the response is not correct, **characterised in that** the correct response changes as a function of the challenge delivered to the person being monitored and rules for responding known to the person being monitored.

2. An apparatus as claimed in claim 1, **characterised in that** the means for generating a challenge generates a random challenge.

3. An apparatus as claimed in claim 1 or 2, **characterised in that** the correct response to the challenge is known by the person being monitored, and the means for generating the challenge can record a response made by a person being monitored.

4. An apparatus as claimed in any of the preceding claims in which the person being monitored can respond to the challenge with a response indicating that they need help.

5. An apparatus as claimed in any of the preceding claims **characterised in that** the means for generating a challenge includes a data processor (4) adapted to record the frequency at which challenges are to be issued to a person being monitored, and the contact details of an entity to which an alarm message is to be sent.

6. An apparatus as claimed in any of the preceding claims, in which a record of the time at which a previous challenge and response is maintained.

7. An apparatus as claimed in any of the preceding claims, in which the challenge is issued over a telecommunications network (8).

8. An apparatus as claimed in claim 7 in which the challenge is sent as a text message.

9. An apparatus as claimed in claim 7 or 8, in which a person being monitored has a mobile device (6) for sending a response, and the position of that device can be determined.

10. An apparatus as claimed in any of the preceding claims, in which a plurality of communication devices are positioned along a route that the person being monitored is travelling, and a person being monitored responds to a challenge as they reach each device along the route.

11. A method of monitoring a person, comprising the steps of:

generating a challenge to be sent to a person being monitored, whereby the person being monitored knows how to respond to the challenge;
sending the challenge;
monitoring for receipt of a response to the challenge; and
raising an alert if a response is not received within a preset time period or if a response is incorrect or indicates duress, and in which the challenge is randomly generated, but the rules for responding correctly are known to the person being monitored such that they can calculate and send a correct response to the challenge.

12. A method as claimed in claim 11, **characterised in that** a challenge is generated in accordance with a schedule.

13. A method as claimed in claim 11 or 12 in which the challenge is sent to a mobile telecommunications device associated with the person being monitored.

14. A method as claimed in any of claims 11 to 13 in which the person being monitored can send an incorrect response or a duress response to cause an alert to be raised.

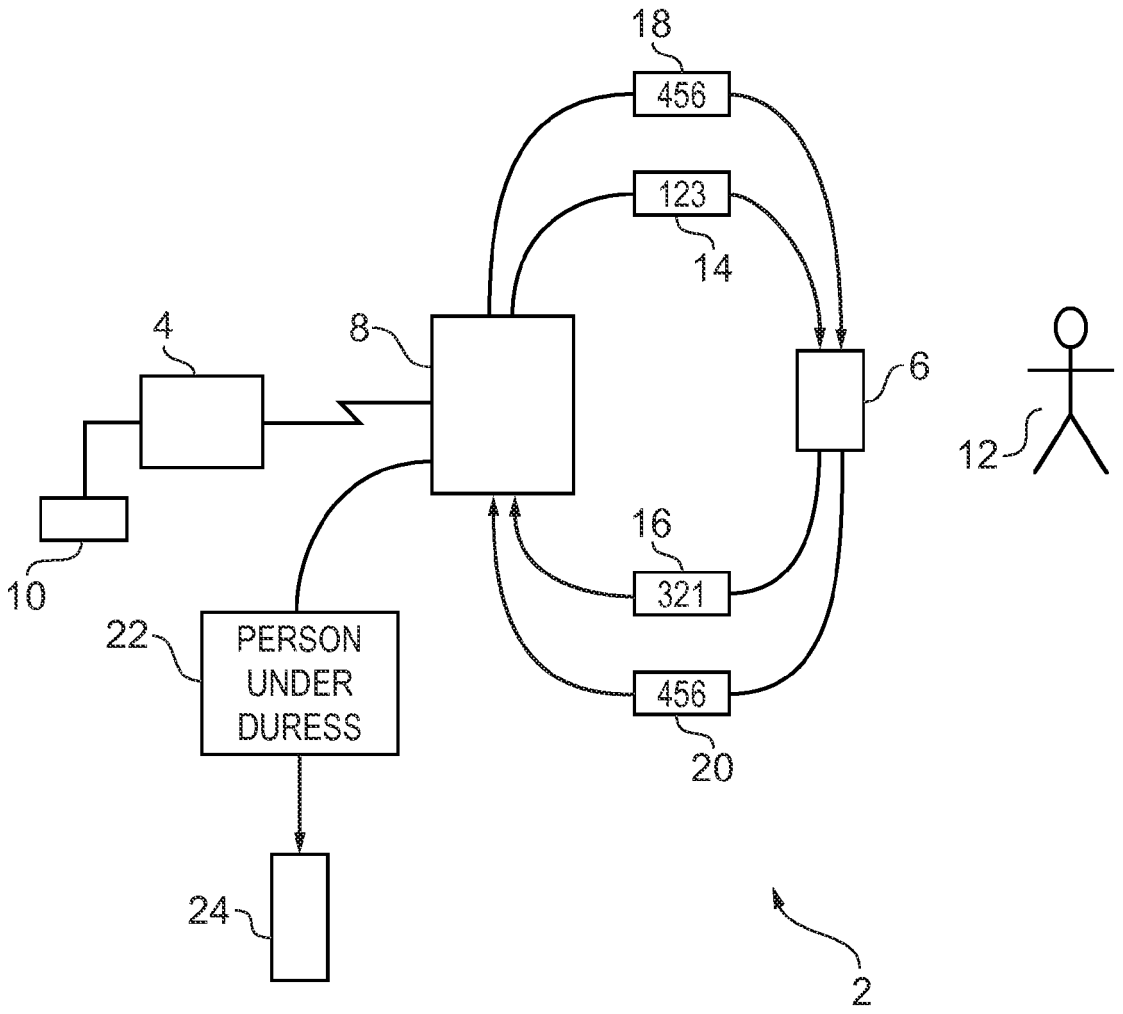

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 7424

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 7 026 928 B1 (LANE JODY D [US]) 11 April 2006 (2006-04-11) * figures 1-3 * * abstract * * column 14, lines 56-67 * * column 15, lines 1-37 * -----	1-15	INV. G08B21/02
X	US 7 042 338 B1 (WEBER HAROLD J [US]) 9 May 2006 (2006-05-09) * figures 1-24 * * claims 1-3 * * column 18, lines 30-67 * -----	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

G08B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 July 2008	Coffa, Andrew

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 15 7424

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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17-07-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7026928 B1	11-04-2006	NONE	
US 7042338 B1	09-05-2006	NONE	

EPO FORM P0459

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