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(54) SOCIAL ALARM SYSTEM

(57) A social alarm system 10 in which an operator of the system may communicate with a client 4 at an extended range from a hub unit 200 is described. The system 10 comprises the aforementioned hub unit 200, trigger device 100 and client device 300. The hub unit 200 receives an alarm signal at a first frequency 102, receives audio data from an operator, and transmits the audio data received from the operator at a second frequency 202. The trigger device 100 originates the alarm signal at the first frequency 102, typically in response to some alarm event, receives audio data from the hub unit at the second frequency 202, and provides a relay for onward transmission of the audio data to the client device 300. The client device 300 receives the relayed audio data from the trigger device and outputs it as sound.

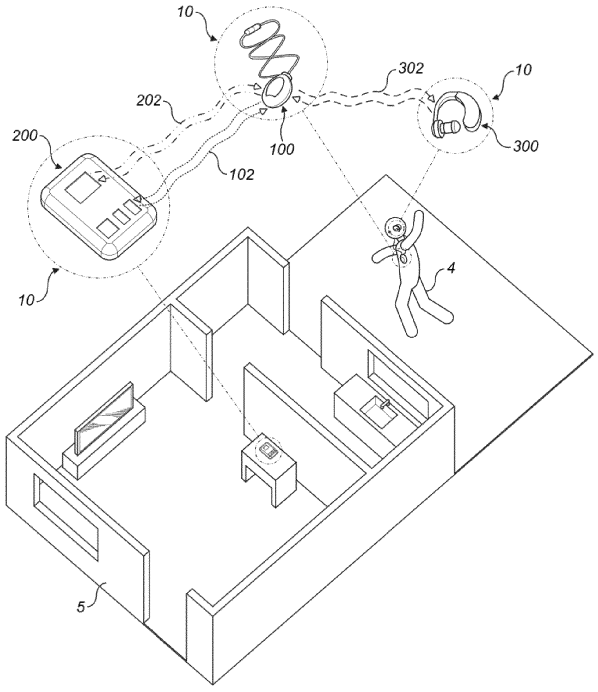

Fig. 2

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Description

Field of the Invention

[0001] The present disclosure relates to a social alarm system and method of operating the same. In particular the present invention relates to a social alarm system which facilitates remote communication between carer and client; thus allowing for remote reassurance of the client by the carer. The present disclosure also relates to devices for use in such a system.

Background

[0002] Social care systems incorporating wearable devices for signalling emergency or distress are well known. For example, a common system includes a pendant worn around the neck, which communicates with a hub unit installed somewhere centrally in the client's dwelling. When the alarm device is activated, either manually by the client or by a predetermined event occurring, such as the client falling over, a signal is sent to the hub unit which in turn raises the alarm with an operator of the social care system. The operator might be an on-site carer but is more commonly situated at a remote call centre. Once the alarm is raised, on-site aid may be dispatched to the client.

[0003] In such a situation it is desirable for the operator of the system to be able to communicate with the client. This allows the client to know the alarm has been successful, and for the operator to reassure the client that aid is on its way. To this end, current hub units make use of the public switched telephone network (PSTN) to place a telephone call with the operator, with the operator's voice output to the local vicinity around the hub unit by integrated speakers.

[0004] A problem with such systems is that reassurance cannot be given to a client who is not within audible range of the hub unit. For example, the client could be hard of hearing, such that the range at which they can hear audio from the hub unit is much lower than might otherwise be presumed, or the client may be in the garden when the alarm is triggered and unable to hear the hub (which will have been installed within their dwelling). In such situations the client may remain unaware that the alarm has been raised, and feelings of distress may increase. To help alleviate this problem, some alarm devices are configured to receive an alarm acknowledgement from the hub which causes an LED to be lit, thereby visually informing the client that the alarm has been successfully raised. Such systems however do not address the inability of the operator to communicate with the client to provide reassurance.

[0005] Hence it is highly desirable to provide an improved social care system which overcomes such limitations.

Summary

[0006] The example embodiments have been provided with a view to addressing at least some of the difficulties that are encountered with current social alarm systems, whether those difficulties have been specifically mentioned above or would otherwise be appreciated from the discussion herein.

[0007] In particular it is an object of the present invention to provide a social alarm system which allows for an operator to reassure a client in distress when that client might be outside the normal audible range of their hub unit. Reassurance from the call centre operator can provide an invaluable contribution to lowering the client's state of distress; for example from knowing that the alarm has been heard and acknowledged and also that appropriate action, such as dispatch of local aid, is being taken. Moreover, constant communication with the client in order to keep them apprised of the situation, such as an estimated time of arrival of a paramedic, can aid in keeping the client at ease.

[0008] The present invention is defined according to the independent claims. Additional features will be appreciated from the dependent claims and the description herein.

[0009] In one aspect of the invention there is provided a social alarm system comprising a hub unit, trigger device and client device. The hub unit is arranged to receive an alarm signal at a first frequency, receive audio data from an operator, and transmit the audio data received from the operator at a second frequency. The trigger device is arranged to originate the alarm signal at the first frequency, receive audio data from the hub unit at the second frequency, and provide a relay for onward transmission of the audio data received from the hub unit. The client device is arranged to receive relayed audio data from the trigger device and output the audio data as sound.

[0010] The first frequency may be a frequency band reserved for social alarm uses, such as 869.2125MHz, which is permitted to carry alarm information only. The second frequency may be within the 2.4 GHz band. The first and second frequencies are suitable for communication on the scale of a dwelling and immediate surroundings. For example, the first frequency may be suited for operation at ranges of up to 100 metres indoors (through walls) and up to 400 metres in open air, while the second frequency may be suited for operation up to a few tens of metres (depending on attenuation through walls and obstacles, etc). The audio data may be relayed from the trigger device to the client device via Bluetooth, and the trigger device and client device may be suitably optimised for good signal strength in a range of up to a metre.

[0011] The trigger device may be a social alarm such as a fall detector, and may be embodied as a pendant, watch, belt clip, or like devices. The client device may be an audio device worn by the client; in a preferred example, a hearing aid. Thus, the presently disclosed social

alarm system leverages devices born by the client to extend the range at which the operator may communicate with the client in an emergency (alarm) situation; that is, the client does not need to be within an audible range of the hub unit (typically a few metres in a dwelling) in order to receive audio from the operator.

[0012] In another aspect of the invention there is provided a social alarm trigger device which facilitates communication between an operator and a client in a social care environment. The alarm trigger comprises an alarm module and first and second communication modules. The alarm module is configured to transmit an alarm signal to a hub unit at a first frequency, such as a reserved social alarm frequency. The alarm signal may be generated in response to a trigger event activating the alarm module, such as a fall, or manual activation by a client. The first communication module is configured to receive audio data from the hub unit at a second frequency, for example a frequency within the 2.4GHz band. Such audio data will have originated from an operator of the social care environment who has been notified of an emergency situation via the transmission of the alarm signal. The second communication module is configured to transmit the audio data received from the hub unit via the first communication module to an electronic client device, such as a Bluetooth hearing aid.

[0013] In another aspect of the invention there is provided a social alarm hub unit for facilitating communication between an operator and a client in a social care environment. The hub unit comprises an alarm module and communication module. The alarm module is configured to receive an alarm signal from a trigger device at a first frequency, such as a reserved social alarm frequency, and call the operator. The operator may be called using a suitable network such as the public switched telephone network or voice over internet protocol. The communication module is configured to provide a two-way audio communication path with the trigger device at a second frequency, which may suitably be in the 2.4 GHz range. Thus the communication module may suitably relay audio from the operator to the trigger device, and conversely relay audio received from the trigger device to the operator.

[0014] In another aspect of the invention there is provided a method of establishing communication between an operator and a client in a social care environment. The method comprises, in response to an event triggering the client trigger device, transmitting an alarm signal from a client trigger device to a client hub unit at a first frequency (such as a reserved social alarm frequency), establishing audio communication between the operator and the client hub unit, providing a communication path between the client hub unit and the client trigger device at a second frequency, and relaying, via the client hub unit and client trigger device, audio from the operator to an audio device carried by the client, and outputting the audio.

Brief Description of the Drawings

[0015] For a better understanding of the present disclosure, reference will now be made by way of example only to the accompanying drawings, in which:

Fig. 1 shows a prior art social alarm system;

Fig. 2 shows an example improved social alarm system;

Fig. 3 shows an example trigger device for the improved social alarm system;

Fig. 4 shows an example alarm hub for the improved social alarm system; and

Fig. 5 shows an example method of operation of the improved social alarm system.

Detailed Description

[0016] Figure 1 shows an example prior art social alarm system. The system includes a trigger device 1 configured to transmit a radio frequency (RF) alarm signal 2 to a hub unit 3. The trigger device 1 is designed to be born on the body of a client 4, such as a pendant, watch, or belt clip. An example trigger device 1 is a fall detector. These devices comprise means to detect that the client 4 has fallen over and in turn trigger the transmission of the alarm signal 2; one example means is an accelerometer. Such devices are well known in the art and are not covered in further detail here.

[0017] The hub unit 3 is configured to contact a remote operator using a public switched telephone network (PSTN) when it receives the alarm signal 2 from the trigger device 1. Speakers on the hub unit 3 may output the operator's voice. A microphone may additionally be provided to allow for the client 4 to talk back to the operator.

[0018] The hub unit 3 is typically installed somewhere central within a client's dwelling 5, in order to improve the chances of the alarm signal being received by the hub unit 3. In some example systems, the hub unit 3 is configured to transmit an acknowledgement to the trigger device 1 that the alarm signal 2 has been successfully received.

[0019] The trigger device 1 and hub unit 3 are configured to operate on a radio frequency which is specifically reserved for social alarm systems. This applies whether the system is setup for one-way alarm transmission or two-way, bidirectional, alarm and acknowledgement. That is, signals transmitted between the trigger device 1 and hub unit 3 are all done at the reserved frequency. For most countries, the reserved frequency lies within the frequency band ranging from 312 MHz to 921 MHz (megahertz). By way of example, in the UK the frequency is 869.2125MHz. It will of course be appreciated that other reserved frequencies could be utilised. Transmission

of data other than an alarm signal or acknowledgment of the signal is not permitted on the reserved social alarm frequency.

[0020] Figure 2 shows an example improved social alarm system 10 which aims to address the problem of the client 4 being outside of an audio range of the hub unit 3. In such a situation the client 4 cannot receive updates from the operator, which results in increased distress of the client 4. In this example the social alarm system 10 comprises a trigger device 100, a hub unit 200, and a client device 300.

[0021] The improved social alarm system 10 starts from the same premise as the social alarm system of Figure 1. The trigger device 100 is arranged to transmit an alarm signal at a first radio frequency 102 (e.g. the reserved social alarm frequency). The hub unit 200 is suitably configured to receive signals at that first frequency 102, identify the alarm signal sent by the trigger device 100, and contact an operator to notify them that the trigger device 100 has been triggered and the client 4 requires aid. In this example the hub unit 200 is configured to establish an audio call with the operator using an appropriate network: e.g. PSTN, Voice over Internet Protocol (VoIP), or cellular telecommunication network, though such a list is not exhaustive.

[0022] The trigger device 100 and hub unit 200 are further configured to communicate at a second frequency 202, which is different to the first frequency. The second frequency 202 is a frequency which is not the reserved social alarm frequency, and is preferably not within the social alarm frequency band of 312 MHz to 921 MHz. Ideally the second frequency 202 (or more generally a frequency band from which such a frequency resides) is chosen to be significantly different to the first frequency; such a configuration reduces the possibility of cross talk between signals sent and the first and second frequencies. Preferably the second frequency 202 is within the range 2400 to 2500 Mhz, otherwise known as the 2.4 GHz (Gigahertz) RF band. This frequency band is commonly utilised by existing radio electronic devices, making it significantly easier to source components and manufacture the trigger device 100 and hub unit 200. Moreover, providing a suitable communication protocol is chosen, the 2.4 GHz band is suitable for communication at ranges of at least a few tens of metres in order to achieve good connection between hub unit 200 and trigger device 100 within a dwelling, and up to 100 metres outside the dwelling (with no obstacles in the way).

[0023] As communication at the second frequency does not involve the reserved social alarm frequency, such communication is not restricted in the data that can be transmitted. Suitably the second frequency 202 can carry audio data between the hub unit 200 and the trigger device 100. In one example, the communication is one-directional from the hub unit 200 to the trigger device 100; that is the hub unit 200 transmits audio data and the trigger device 100 receives it. In another example, the communication is bidirectional, such that the hub unit 200 and trigger device 100 may both transmit and receive audio data at the second frequency 202.

[0024] The trigger device 100 is not itself, however, suitable to output audio received at the second frequency 202. The overarching design parameters for a trigger device 100 are that it should be rugged, lightweight, and International Protection Code (IP) 67/68 compliant (i.e. totally protected against dust ingress and protected from continuous liquid immersion at around 1 to 3 metre depth). One way in which these design aims are met is to provide the trigger device 100 with a small, lightweight, battery; in many examples the battery is non-replaceable. A trigger device operating according to Figure 1 is typically desired to operate for around 5 years before requiring replacement due to a dead battery. Thus the trigger device 100 is not suitable for incorporating speakers to output audio, nor a microphone to receive audio, because these components require a significant amount of power to operate, and would therefore significantly reduce the operational lifespan of the trigger device. Moreover, adding such components would make achieving IP67/68 compliance more difficult and costly.

[0025] Suitably the trigger device 100 is configured to communicate with the client device 300 in order to relay audio data received at the second frequency 202 to the client device 300. Put another way, the trigger device 100 transmits the audio data to the client device 300 at a third frequency 302.

[0026] The client device 300 receives the relayed audio data and outputs the audio. Suitably the client device 300 should be a device which is configured to output audio. In a preferred example the client device 300 is a hearing aid. Such devices are designed to be continually worn by those who are hard of hearing, and therefore are particularly suitable for use in the system 10 which aims to facilitate communication in response to an emergency which could occur at any time of day. Thus, when the trigger device 100 is triggered, and the alarm is raised, the operator may communicate to the client 4 via their hearing aid, allowing the operator to reassure the client 4. Moreover, the social alarm system 10 facilitates communication with the client 4 regardless of location of the client 4 with respect to the hub unit 200 (i.e. regardless of whether they are within audible range of speakers on the hub); provided the client 4 is within range for communication at the first and second frequencies 102, 202, of course.

[0027] Both the trigger device 100 and client device 300 are envisaged as being born on the body of the client 4 - e.g. wearable devices - such that communication between the devices may be achieved using a short-range communication protocol. Shorter range radio frequency transmissions consume far less power than longer range transmissions while providing fast data rates to achieve good audio quality.

[0028] Preferably the trigger device 100 and client device 300 communicate using Bluetooth low energy (BLE) Audio. That is, the third frequency 302 is preferably in

the 2.4 GHz RF band, as with the second frequency 202, though in contrast to the second frequency 202, is configured to operate on a short-range protocol. As of Bluetooth version 5.2, BLE Audio provides an ultra-low power protocol for audio transmission via radio frequency communication. Advantageously, BLE Audio is being introduced to the next generation of hearing aids, making integration of such hearing aids with the system 10 considerably easier. BLE Audio hearing aids are optimised to operate at the ear-to-ear distance of around 20 centimetres, with a maximum range between 50 centimetres to 1 metre in order to be able to connect with a nearby BLE device; thus the hearing aid keeps battery consumption to a minimum so as to maximise time between battery charges. It will be appreciated that the maximum range of 1 metre for BLE communication from with the hearing aid renders direct communication with the hub unit 200 impractical. Thus, advantageously, the trigger device 100 provides the long-range relay for audio from the hub unit 200. Suitably the trigger device 100 may be configured for BLE operation at up to 1 metre, to also benefit from minimal power consumption.

[0029] Figure 3 shows an example trigger device 100 for use in the system 10 in more detail. The trigger device comprises a battery 104 to power the device and a processor 106 to control components of the device. The trigger device also includes an alarm module 108, first communication module 110, and second communication module 112, which may each be suitably controlled by the processor 106. Put another way, the processor 106 may be considered a component part of each of the modules 108, 110, 112.

[0030] The alarm module 108 is configured to transmit the alarm signal to the hub unit 200. The alarm module 108 comprises an RF unit 114 which transmits at the first frequency 102 (and in some examples may also receive at the first frequency 102) and a sensor 116. The sensor 116 comprises means for detecting an emergency event; such means might include e.g. an accelerometer, as in some prior art fall detectors, and/or a client operated actuator. In response to the sensor 116 outputting a signal that a trigger event has occurred (e.g. a fall), the alarm module 108 generates an alarm signal and controls the antenna 114 to transmit the signal at the first frequency 102. The alarm signal may include a unique identifier (ID) which identifies the particular trigger device transmitting the alarm signal. In addition, in response to the alarm module 108 transmitting the alarm signal, the processor 106 sends a power on / wake command to the first and second communication modules, which are otherwise in a low power mode, or sleep state, in order to conserve power and reduce battery drain.

[0031] The first communication module 110 is configured to communicate with the hub unit 200. Suitably the first communication module 110 comprises an RF unit 118 configured to operate at the second frequency 202. In one example, the RF unit 118 is a receiver configured only to receive audio data from the hub unit 200. In this way, audio from an operator which is received via the hub unit 200 as part of the call between the hub unit 200 and operator, can then be received by the trigger device 100 and processed by the first communication module 110. In another example, the RF unit 118 is a transceiver configured to both receive and transmit and the second frequency 202; thus communication between the trigger device 100 and hub unit 200 may be made bidirectional. That is, in this example, the first communication module 110 may control the RF unit 118 to transmit audio back to the hub unit 200 at the second frequency 202.

[0032] The first communication module 110 is optimised for long range communication but minimal power consumption. The intended use case of the trigger device 100 is to a range of approximately 100 meters from the hub unit 200. Suitably an antenna of the RF unit 118 is appropriately dimensioned to provide good signal strength at up to 100 meters. An antenna configured to operate at greater distances would draw more power, which is undesirable.

[0033] The first communication module 110 is configured to monitor for two copies of a data packet received by the RF unit 118 at the second frequency 202. A message (e.g. audio data) within the packet is then reconstructed from the two received copies. Similarly, if the RF unit 118 is configured to transmit data, two transmissions are sent to be reconstructed by the hub unit 200. In this way reliability of the data transmission/receipt may be improved without unduly draining power through numerous repeat transmissions/receptions. It will be appreciated that data loss leading to corrupted audio will likely increase distress of the client 4 and is therefore undesirable. In between transmissions and receptions, the first communication module 110 may be put into a low power state by the processor 106, to further conserve power.

[0034] The first communication module 110 may be configured to initially enter a handshake mode when it is powered on in response to the emergency alarm. The handshake mode establishes that the trigger device 100 has been previously paired (i.e. authenticated) with the hub unit 200; by way of analogy, the trigger device 100 may act like a client in a WIFI network which has previously been authenticated to the hub unit 200. In this way the trigger device may be assured of only communicating with the hub unit 200, thereby improving security of the system 10; that is, a dedicated communication channel may be established between the trigger device 100 and hub unit 200. Suitably the data transmitted at the second frequency may be encoded. It will be appreciated that other methods of opening a communication channel between two devices via authentication may be utilised, as will be appreciated by those skilled in the art.

[0035] The second communication module 112 is configured to communicate with the client device 300. More specifically, the second communication module is configured to transmit audio data that was received by the first alarm module 110 to the electronic client device 300. Suitably the second communication module comprises

an RF unit 120. In one example, the RF unit 120 is configured as a transmitter for one-way transmission to the client device 300. In another example the RF unit 120 is a transceiver configured for bidirectional transmission and receipt to and from the client device 300.

[0036] The RF unit 120 is optimised for short range communication. In particular, the RF unit 120 is optimised to operate up to approximately 1 metre distance. Preferably the RF unit 120 is configured to operate using Bluetooth low energy frequencies in order to more easily communicate with existing client devices such as BLE hearing aids. Suitably the second communication module 112 is configured to translate data received by the first communication module 110 to data suitable for transmission using BLE. Similarly, the second communication module 112 may convert BLE data received from the client device 300 to data suitable for transmission at the second frequency 202 by the first communication module 110; alternatively, such translation functionality may be provided by the first communication module 110 itself.

[0037] Thus, audio from the operator routed through the hub unit 200 and trigger unit 100 may be relayed to the client device 300. In this way the client 4 is able to hear the reassuring tones and status updates provided to them by the operator, thereby reducing the distress of the client 4. Moreover, if the client device 300 includes a microphone, then the client 4 and operator may have a bidirectional conversation, further reducing the distress of the client 4.

[0038] Like the first communication module 110, the second communication module 112 may also enter a handshake or pairing mode when the alarm module 108 detects an emergency (e.g. a fall event). Bluetooth low energy is able to operate in an unsecured mode, however it is preferable that the devices communicate in a secured, paired, mode for audio communication. This prevents the audio being received and reproducible by an unintended nearby Bluetooth device. Pairing in BLE typically requires the entry of a pin number. It will be appreciated that this is undesirable during an emergency event, and so the trigger device 100 and client device 300 should be paired with each other (i.e. authenticated to each other) prior to live use of the social alarm system 10. With prior pairing the trigger device 100 and client device 300 can communicate securely without the need for authentication during an alarm event.

[0039] Figure 4 shows an example social alarm hub unit 200 for use in the social care system 10. The hub unit 200 comprises an alarm module 204 configured to receive the alarm signal from the trigger device 100 at the first frequency 102, and may further be configured to transmit a brief acknowledgement to the trigger device 100 at the first frequency 102. The alarm module 204 is also configured to place a call to an operator of the care system 10 in response to receiving the alarm signal. As outlined above, this may be via a suitable network such as PSTN or VOIP.

[0040] The hub unit 200 further comprises a communication module 206 configured to provide an audio communication path with the trigger device 100. Suitably the communication module comprises an RF unit 208 which operates at the second frequency 202; e.g. the RF unit 208 is configured to operate at frequencies within the 2.4 GHz RF band. The communication path may be one-way, in which case the RF unit 208 may be a transmitter only, or the communication path may be two way, in which case the RF unit may be a transceiver. In the case of two-way communication, the communication module 206 is further configured to pass audio data received from the trigger device 100 to the alarm module 204 for onward transmission to the operator.

[0041] When transmitting, the communication module 206 is configured to transmit two copies of a data packet via the RF unit 208. Similarly, when receiving via the RF unit 208, the communication module 206 is configured to reconstruct data within a packet from up to two copies of the packet. Two data transmissions has been determined by the inventor to provide sufficient reliability of signal receipt when accounting for data loss and the like that might be expected within a dwelling.

[0042] The communication module 206 is activated in response to the alarm module 204 receiving the alarm signal from the trigger device 100. The remainder of the time the communication module 206 is in a low power (or sleep) state. When activated, the communication module 206 opens a communication channel at the second frequency 202. That is, the communication module 206 initiates a handshake (or pairing) mode and when the trigger device 100 is authenticated to the hub unit 200 the communication path to/from the trigger device 100 may be considered open. In this way, communications between the trigger device 100 and hub unit 200 may be secured, thereby improving security of the social alarm system. In one example, authentication may be exclusive between the hub unit 200 and a specific trigger device 100, so that communication is only possible between those two devices when an alarm event is occurring. This may be appropriate for a hub unit installed in a private dwelling. In another example, the hub unit 200 may be configured to allow any authenticated trigger device within range to communicate with it. This may be suitable in a multi-client operating environment, such as a care home. In either configuration however outside communication with the operator or the client from a non social care system device is prevented.

[0043] The hub unit 200 further comprises a power supply 210, which is typically mains power, and a processor 212 which controls the alarm module and communication module.

[0044] Figure 5 summarises an example method of operating the social alarm system 10 to establish communication between operator and client in a social care environment. At step 501, an alarm signal is transmitted from the trigger device 100 and received by the hub unit. The alarm signal is transmitted in response to actuation of the trigger device by either manual operation or a

sensed event. Preferably the alarm signal is sent at a radio frequency specifically reserved for social alarm use.

[0045] At step 502 the hub unit 200 alerts an operator of the social care system 10. For example, the hub unit 200 may place a call over PSTN or voice over IP to a call centre at which the operator is situated.

[0046] At step 503 an audio path is established between the hub unit 200 and trigger device 100 at a second frequency (which is different to the first frequency). Optionally, establishing the communication path may involve authenticating the hub unit and trigger device to each other.

[0047] At step 504, an audio path is established between the trigger device 100 and client device 300. Optionally, establishing the audio communication path may include authenticating the client device and trigger device to each other.

[0048] The ordering in which steps 502, 503 & 504 occur is not significant, and for all intents and purposes may be considered to occur substantially simultaneously.

[0049] At step 505, audio received by the hub unit 200 from the operator is transmitted to the trigger device 100. At step 506 that audio is relayed to client device 300 (carried by the client 4) by the trigger device 100. Thus audio may be transmitted at long range between the hub unit 200 and trigger device 100, and at short range between the trigger device 100 and client device; for example using Bluetooth low energy.

[0050] At step 507 the client device 300, e.g. hearing aids, outputs the audio from the operator. Thus communication between the operator and client 4 is established. Optionally the client 4 may communicate back to the operator (i.e. the devices transmit audio in the opposite direction, such that steps) if the client device 300 has a microphone and the trigger device is suitable configured to transmit audio data to the hub unit 200.

[0051] In this way the operator is able to provide important reassuring communication and status updates to the client 4, such as an estimated time of arrival of incoming aid, thereby easing the client's distress. In the case where the client device 300 has a microphone the client may also provide the operator with crucial information such as their location on their premises, which can save valuable seconds in getting aid to them in a timely manner (because the aiders no longer need to search for the client 4). Moreover, the client 4 and operator may efficiently communicate without requiring the client 4 to be within audio range of their hub unit 200. Of course, nothing precludes the client 4 communicating back to the operator via a microphone on the hub while receiving clear audio direct to their ears via their hearing aid.

[0052] In summary, exemplary embodiments of an improved social care alarm system have been described in which an operator of the system may communicate with a client at an extended range from a hub unit compared with prior art systems.

[0053] The components of the system may be manufactured industrially. In particular, it is envisaged that many of the components may be readily obtainable via mass manufacturing sources in order to facilitate ease of construction and reduce cost of construction. An industrial application of the example embodiments will be clear from the discussion herein.

[0054] Although preferred embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made without departing from the scope of the invention as defined in the claims.

Claims

1. A social alarm system, comprising:

   a hub unit arranged to receive an alarm signal at a first frequency, receive audio data from an operator, and transmit the audio data received from the operator at a second frequency;
   a trigger device arranged to originate the alarm signal at the first frequency, receive audio data from the hub unit at the second frequency, and provide a relay for onward transmission of the audio data received from the hub unit; and
   a client device arranged to receive relayed audio data from the trigger device and output the audio data as sound.

2. The social alarm system of claim 1, wherein the trigger device transmits audio data to the hub unit at the second frequency.

3. The social alarm system of claims 1 or 2, wherein the first frequency is within a social alarm band of 312 MHz to 921 MHz, and the second frequency is a frequency outside the social alarm band.

4. The social alarm system of any one of claims 1 to 3, wherein the second frequency is between 2400 to 2500 MHz.

5. The social alarm system of any one of claims 1 to 4, wherein the client device and trigger device communicate using Bluetooth low energy to relay audio from the trigger device to the client device.

6. The social alarm system of claim 5, wherein client device is a Bluetooth hearing aid.

7. A social alarm trigger device for facilitating communication between an operator and a client in a social care environment, comprising:

   an alarm module configured to transmit an alarm signal to a hub unit at a first frequency;
   a first communication module configured to receive audio data from the hub unit at a second

frequency; and
a second communication module configured to transmit the audio data received from the hub unit via the first communication module to an electronic client device.

8. The social alarm trigger device of claim 7, wherein the first communication module and second communication module are woken from a low power state in response to the alarm module transmitting the alarm signal.

9. The social alarm trigger device of any of claims 7 or 8, wherein the first communication module is further configured to transmit audio data to the hub unit at the second frequency.

10. The social alarm trigger device of claim 9, wherein the second communication module is further configured to receive audio data from the client device.

11. The social alarm trigger device of any of claims 7 to 9, wherein the first communication module is configured to transmit two copies of a data packet at the second frequency.

12. A social alarm hub unit for facilitating communication between an operator and a client in a social care environment, comprising:

an alarm module configured to receive an alarm signal from a trigger device at a first frequency, and call the operator;
a communication module configured to provide a two-way audio communication path with the trigger device at a second frequency.

13. The social alarm hub unit of claim 12, wherein the communication module is activated from a low power state in response to the alarm module receiving the alarm signal from the trigger device.

14. The social alarm hub unit of claim 12 or 13, wherein the communication module is configured to transmit two copies of an audio data packet at the second frequency.

15. A method of establishing communication between an operator and a client in a social care environment, the method comprising:

transmitting an alarm signal from a client trigger device to a client hub unit at a first frequency, in response to an event triggering the client trigger device;
establishing audio communication between the operator and the client hub unit;
providing a communication path between the client hub unit and the client trigger device at a second frequency; and
relaying, via the client hub unit and client trigger device, audio from the operatorto an audio device carried by the client, and outputting the audio.

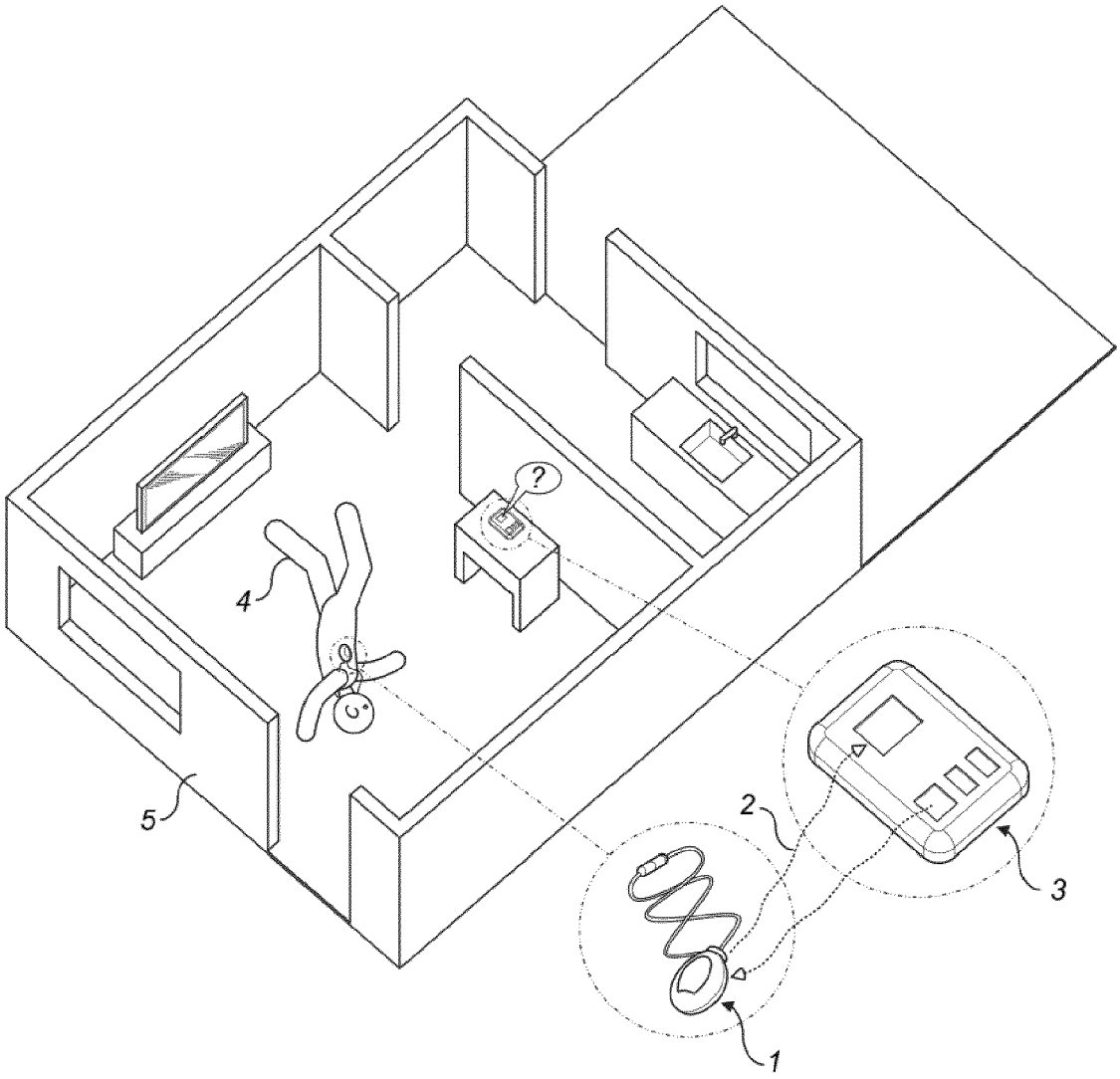


Fig. 1

- - PRIOR ART - -

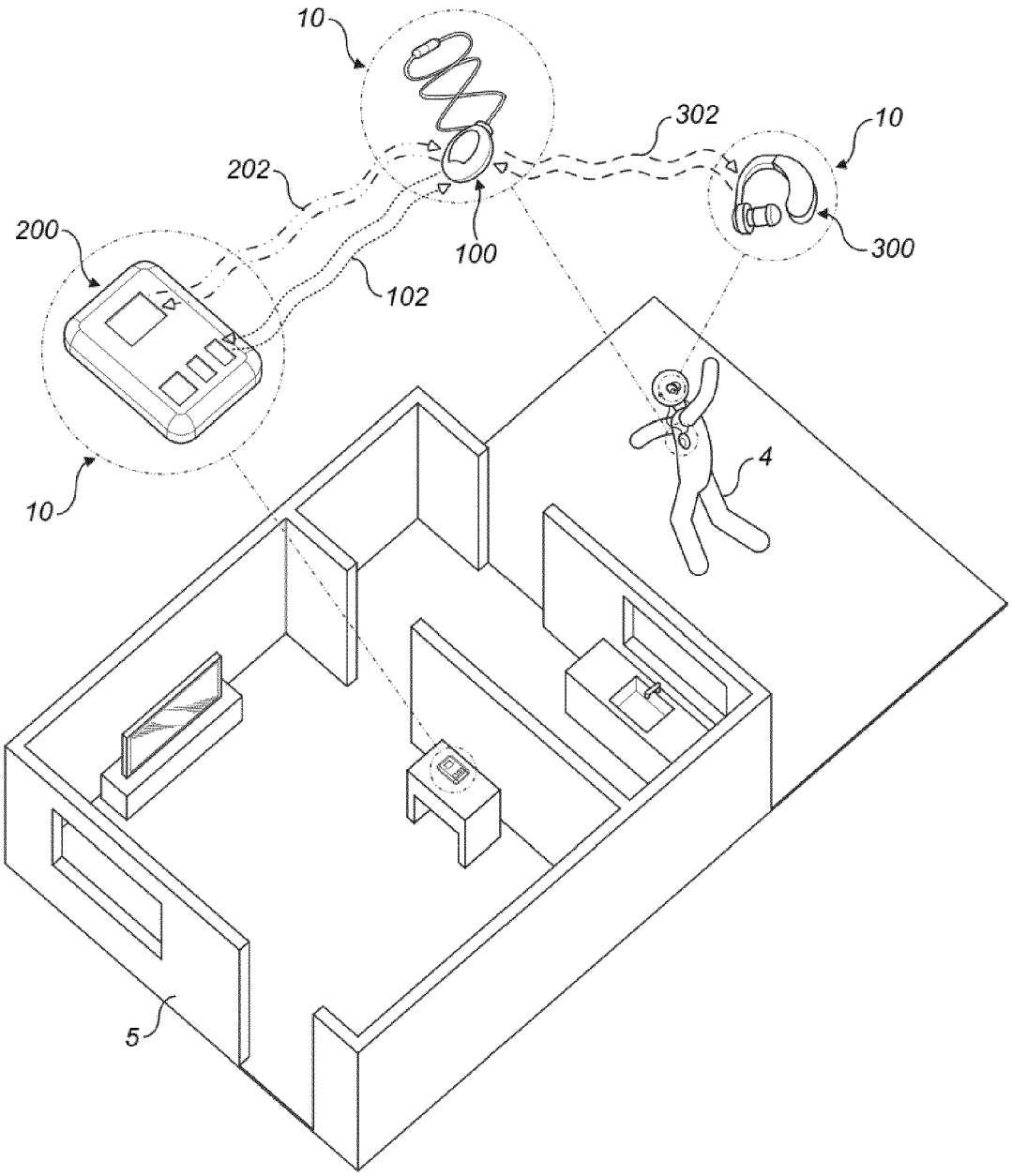
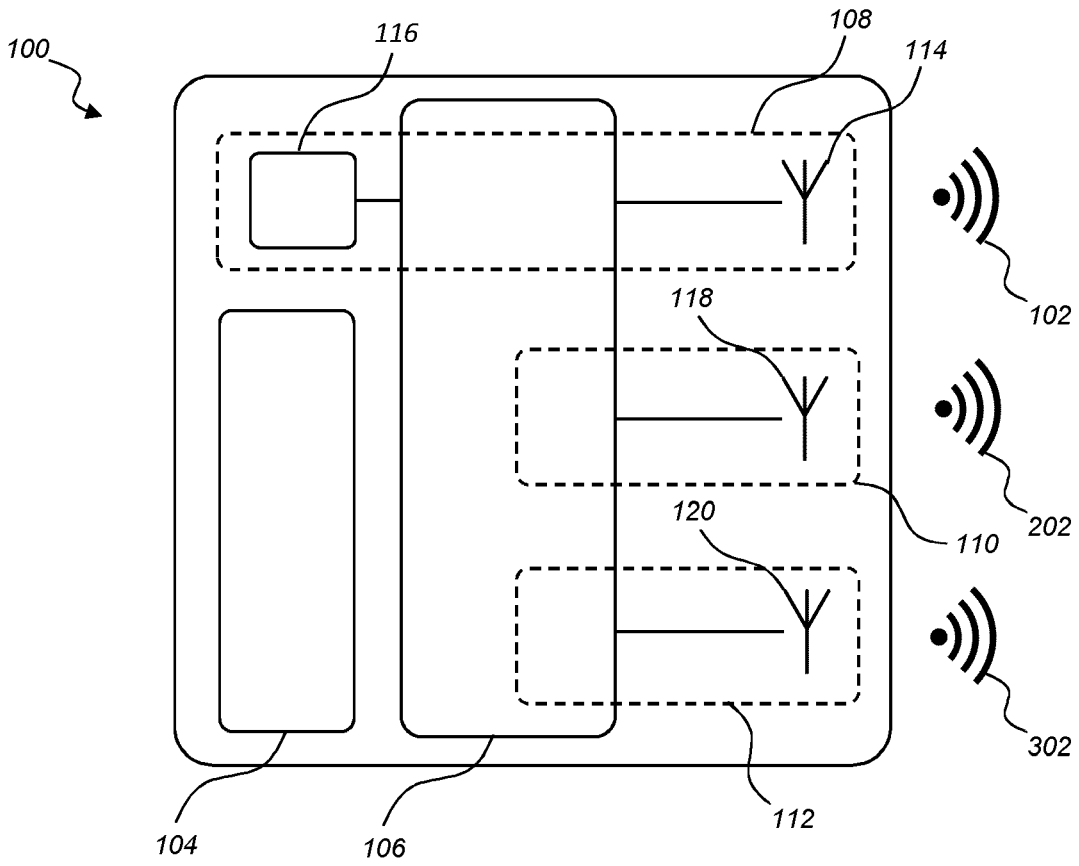


Fig. 2


100
116
108
114
102
118
202
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120
302
104
106
112

Fig. 3

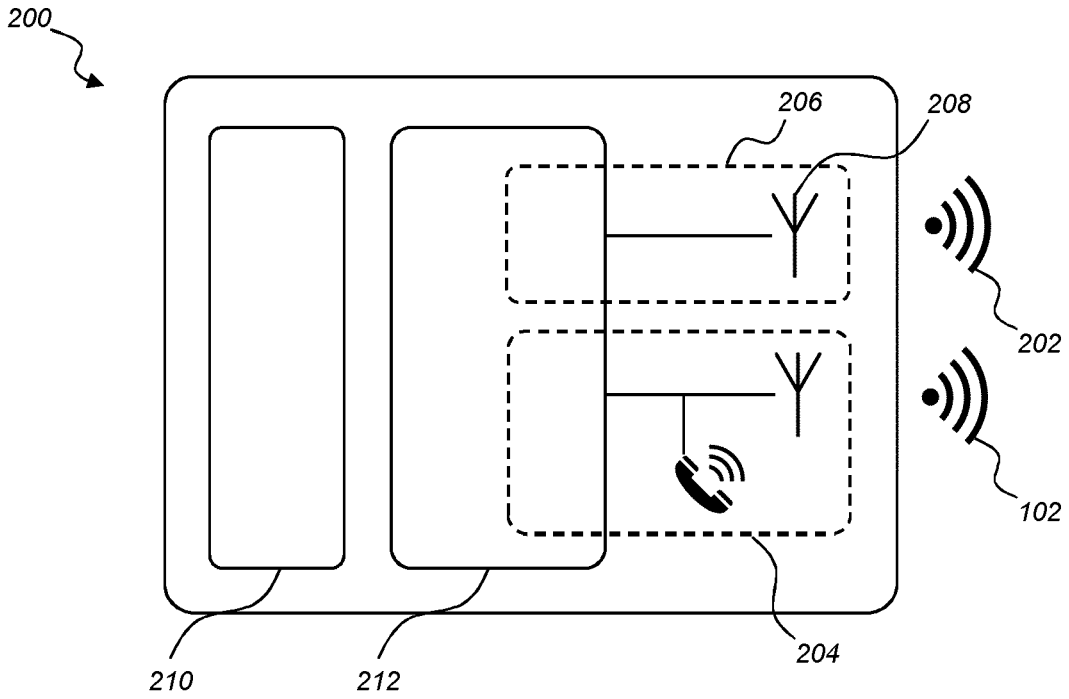
200
206
208
202
102
210
212
204

Fig. 4

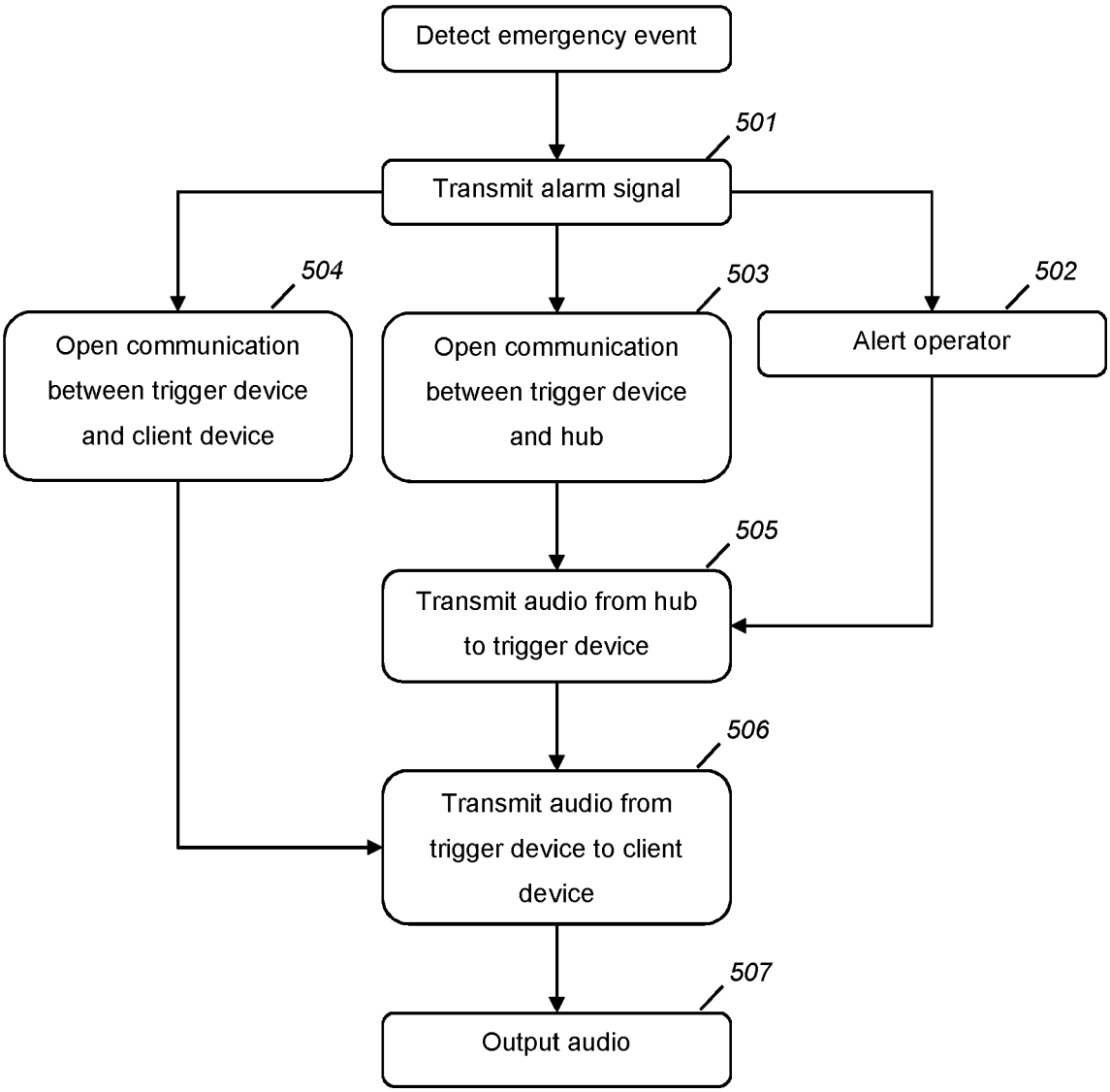
Detect emergency event
501
Transmit alarm signal
504
Open communication between trigger device and client device
503
Open communication between trigger device and hub
502
Alert operator
505
Transmit audio from hub to trigger device
506
Transmit audio from trigger device to client device
507
Output audio

Fig. 5

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EUROPEAN SEARCH REPORT

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G08B

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

Place of search	Date of completion of the search	Examiner
Munich	16 December 2021	Meister, Mark

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EUROPEAN SEARCH REPORT

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

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