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(54) **MOBILE HELP BUTTONS WITH MULTIPLE LOCATION TECHNOLOGIES**

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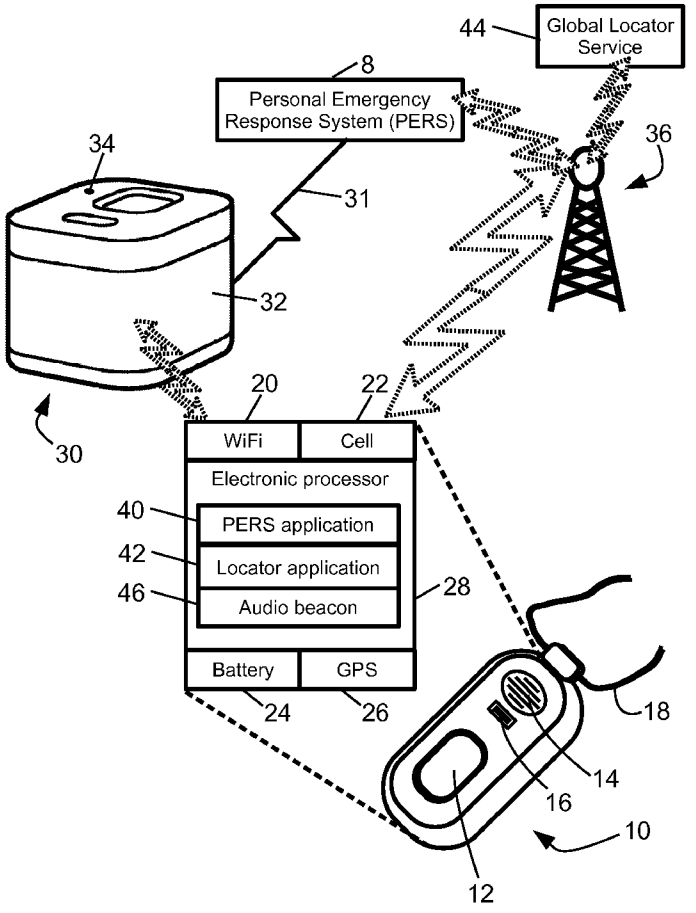
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(57) **ABSTRACT**

A mobile help button device (**10**) comprises a help button (**12**) with WiFi (**20**) and cellular (**22**) communication and a global positioning system (GPS) receiver (**26**). The mobile help button device (**10**) is programmed to perform a locator method including: attempting to wirelessly connect with a base station (**30**); acquiring WiFi access point (AP), cellular tower, and GPS information; and determining a location. The location is set to a home location if the attempt to wirelessly connect with the base station is successful, or is determined by a global locator service (**44**) based on the WiFi AP, cellular tower, and GPS information if the attempt to wirelessly connect with the base station is unsuccessful. The location may be tracked over time by breadcrumbing, and the location is determined from the breadcrumbing if the global locator service cannot be reached. An audio beacon (**46**) may also be provided.



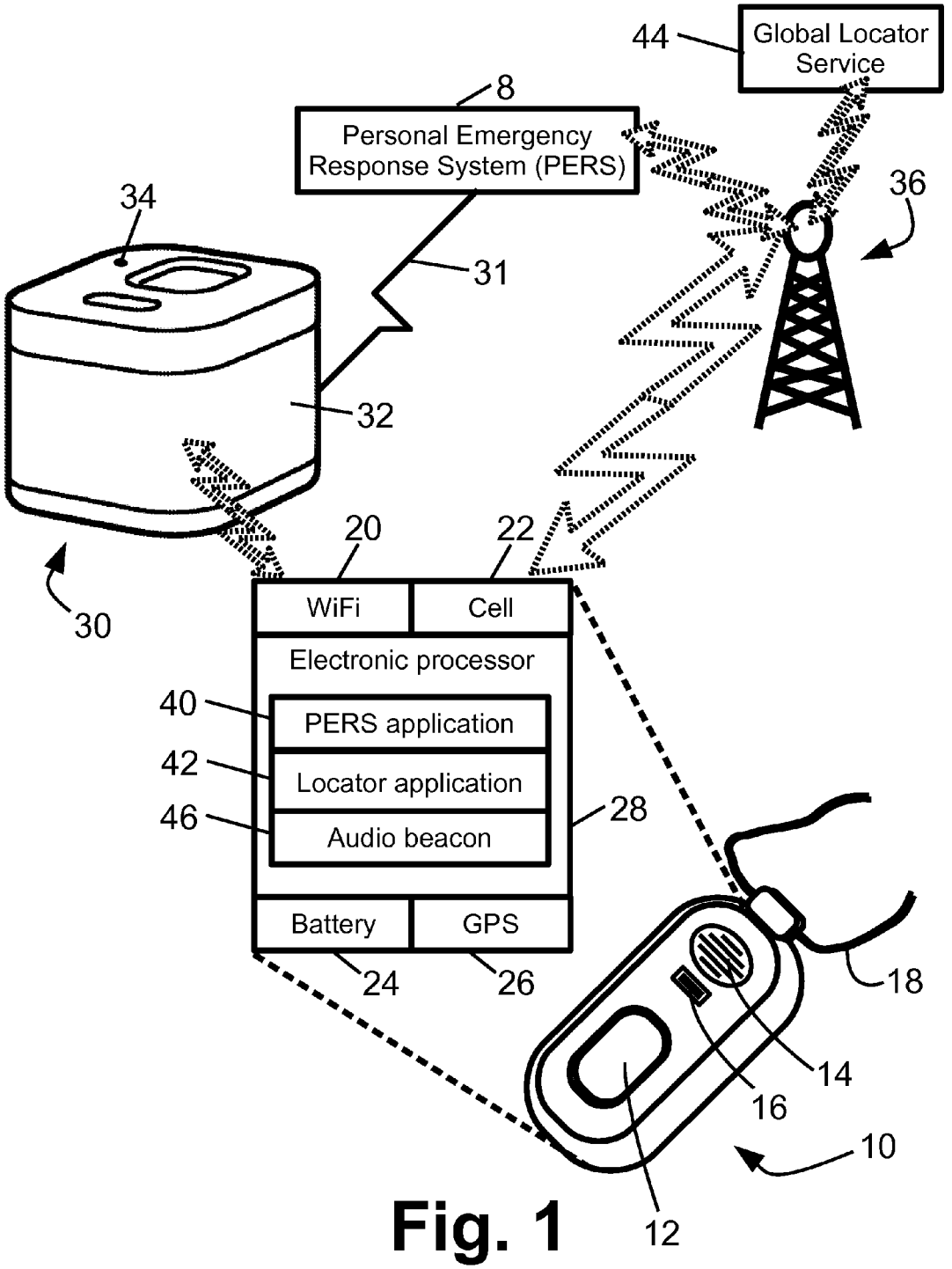

44
Global Locator Service
8
Personal Emergency Response System (PERS)
34
36
31
32
20
22
30
WiFi
Cell
Electronic processor
40
PERS application
42
Locator application
46
Audio beacon
28
Battery
GPS
24
26
18
14
16
10
12

Fig. 1

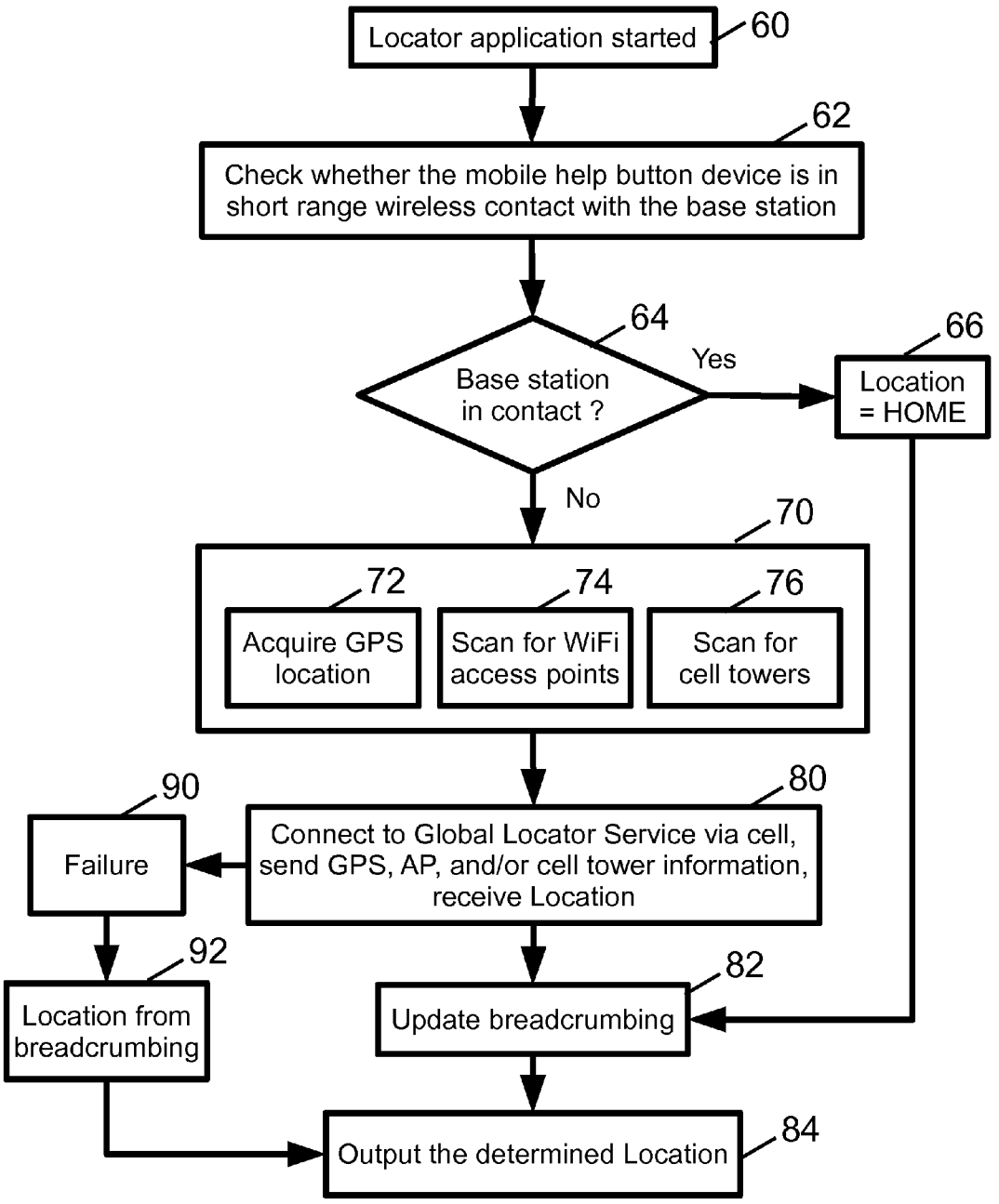

Locator application started
60
62
Check whether the mobile help button device is in short range wireless contact with the base station
64
Base station in contact ?
Yes
66
Location = HOME
No
70
72
Acquire GPS location
74
Scan for WiFi access points
76
Scan for cell towers
90
Failure
80
Connect to Global Locator Service via cell, send GPS, AP, and/or cell tower information, receive Location
92
Location from breadcrumbing
82
Update breadcrumbing
84
Output the determined Location

Fig. 2

MOBILE HELP BUTTONS WITH MULTIPLE LOCATION TECHNOLOGIES

FIELD

[0001] The following relates generally to the Personal Emergency Response System (PERS) arts and related arts.

BACKGROUND

[0002] A Personal Emergency Response System (PERS) enables an elderly person or other person at elevated risk of incapacitating medical emergency to summon help. For example, a PERS may be activated by a person experiencing a debilitating fall, a heart attack, an acute asthma attack or other respiratory emergency, or so forth. The PERS typically includes a call button in the form of a necklace-worn pendant, a bracelet, or the like. By pressing the call button, a speakerphone console in the residence is activated, by which the at-risk person is placed into telephonic contact with a PERS personal response agent (PRA). The PRA speaks with the calling person (hereinafter referred to as a PERS "subscriber" as the person subscribes with the PERS service, although any associated costs or fees may be paid by a medical insurance company or other third party), and takes appropriate action such as talking the subscriber through an asthma episode, summoning emergency medical service (EMS), dispatching a local PERS agent, neighbor, or other authorized person to check on the subscriber, or so forth. In providing assistance, the PRA has access to a subscriber profile stored on a PERS server, which provides information such as (by way of illustration) name, residence location, demographic information, a list of the person's known chronic conditions, a list of the person's medications, an identification of the nearest hospital, a list of emergency contacts (spouse, relative, friend), physician information, and so forth.

[0003] An important service provided by a PERS is the dispatch of help, e.g. a neighbor or EMS, to the residence of the subscriber. The PERS architecture typically assumes a homebound subscriber (where "home" may be an individual residence, a group residence, an apartment, an assisted care facility, or so forth), and subscriber residence location is provided to the PRA as part of the subscriber's PERS profile. A disadvantage of this architecture is that the PERS is only usable when the subscriber is in his or her residence.

[0004] The following discloses a new and improved systems and methods that address the above referenced issues, and others.

SUMMARY

[0005] In one disclosed aspect, a mobile help button device comprises a help button with WiFi and cellular communication and a global positioning system (GPS) receiver. The mobile help button device is programmed to perform a locator method including: attempting to wirelessly connect with a base station; acquiring WiFi access point (AP), cellular tower, and GPS information; and determining a location (i) as a home location if the attempt to wirelessly connect with the base station is successful or (ii) based on the WiFi AP, cellular tower, and GPS information if the attempt to wirelessly connect with the base station is unsuccessful.

[0006] In another disclosed aspect, a mobile help button device is configured for short-range wireless communication with a base station of a Personal Emergency Response System (PERS). The mobile help button device comprises a call button, a cellular transceiver configured to communicate with a cellular network, a global positioning system (GPS) receiver, and an electronic processor programmed to cause the mobile help button device to perform a locator method to determine a location of the mobile help button device. In the locator method, if the mobile help button device is in short-range wireless communication with the base station, the location is determined as a home location. If the mobile help button device is not in short-range wireless communication with the base station, the locator method attempts to determine the location using location information collected by the mobile help button device including at least cellular tower information collected by the cellular transceiver and GPS information collected by the GPS receiver.

[0007] In another disclosed aspect, a locator method is performed by a mobile help button device with cellular communication. The locator method comprises: determining whether the mobile help button device is in short range wireless communication with a base station; setting the location to a home location if the mobile help button device is in short range wireless communication with the base station; and, if the mobile help button device is not in short range wireless communication with the base station, determining the location by collecting location information including at least information on cellular towers in range of the mobile help button device and sending the collected location information to a global locator service via cellular communication.

[0008] One advantage resides in facilitating a PERS architecture that provides full PERS service including dispatch of assistance to the subscriber's current location both in the residence and outside of the residence.

[0009] Another advantage resides in providing accurate current location information for a PERS subscriber located outside of his or her residence.

[0010] Another advantage resides in providing reliable current location information for a PERS subscriber by leveraging multiple location technologies.

[0011] Another advantage resides in providing assistance to Emergency Medical Service (EMS) personnel to precisely locate the subscriber in a busy setting.

[0012] A given embodiment may provide none, one, two, more, or all of the foregoing advantages, and/or may provide other advantages as will become apparent to one of ordinary skill in the art upon reading and understanding the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention may take form in various components and arrangements of components, and in various steps and arrangements of steps. The drawings are only for purposes of illustrating the preferred embodiments and are not to be construed as limiting the invention.

[0014] FIG. **1** diagrammatically illustrates a Personal Emergency Response System (PERS) architecture providing PERS service both in the residence and when the subscriber is away from the residence including current location as disclosed herein.

[0015] FIG. **2** diagrammatically illustrates an illustrative operation of the locator application of the call button device shown in FIG. **1**.

DETAILED DESCRIPTION

[0016] Techniques disclosed herein identify the subscriber's location for personal emergency alarm service. Cellular, GPS, WiFi technology and a breadcrumbing algorithm are employed synergistically. This information is sent to a global locator service such as the Skyhook™ (Boston, Mass., USA) cloud, which does calculation and presents the location to a PRA during emergency service. Location may be determined based on GPS information, Wifi access point (AP) information, cell tower information, an audio beacon, and/or by the subscriber telling his/her location during voice conversation with the PRA through a cell module. If the end device (e.g. mobile help button, MHB) is in the range of a base station, it is determined that the end device is at its home location. Skyhook's hybrid location service may also be used through the cell module. Cellular, GPS, WiFi technology and a breadcrumbing algorithm are suitably used to determine location in some embodiments.

[0017] In illustrative Personal Emergency Response System (PERS) embodiments described herein, the person served by the PERS service is referred to as a "subscriber". This recognizes that the at-risk person subscribes with the PERS service so that the subscriber's call button device or other PERS hardware are associated with the PERS service and appropriate subscriber data are stored at the PERS server. It is to be understood that the term "subscriber" has no further connotation—for example, any costs or fees associated with the PERS subscription of the subscriber may be paid by the subscriber, or by a medical insurance company, or by a governmental agency, or by some other third party.

[0018] Terminology such as "home" or "residence" merely connotes the location where the PERS base station is installed. The home or residence may, by way of non-limiting example, be an individual residence, a group residence, an apartment, an assisted care facility, or so forth.

[0019] With reference to FIG. **1**, an illustrative PERS infrastructure providing service both in the subscriber residence and when the subscriber is away from the residence is described. The PERS is represented diagrammatically in FIG. **1** as PERS **8**, which diagrammatically represents infrastructure typically including a call center staffed by PERS personal response agents (PRA's) each having an electronic work station including a computer on which a subscriber's profile may be displayed and telecommunication equipment such as a headset via which the PRA can converse with a subscriber. The subscriber carries or wears a wearable mobile help button device **10** which includes a call button **12**, a speaker **14**, and a microphone **16**. The illustrative wearable mobile help button device **10** is a pendant that is worn around the neck via a necklace **18** (shown in part). More generally, the wearable mobile help button device is a unitary device that can have any suitable wearable form factor, such as the illustrative necklace-worn pendant, or a bracelet or wristband mount, or so forth, and includes simple and effective mechanism such as the illustrative push button **12** for triggering a call to a PERS call center. The mobile help button device **10** is suitably battery-powered to enable complete portability. While the illustrative (preferably large) push button **12** is a convenient call trigger mechanism, other call trigger mechanisms are contemplated, such as a voice-activated trigger mechanism. It is also contemplated to provide a wearable mobile help button device that automatically triggers a call based on certain input. For example, the wearable mobile help button device **10** may include an accelerometer and/or altimeter (not shown), and the mobile help button device **10** triggers a call upon the sensor(s) detecting a rapid downward acceleration indicative of a sudden fall event. The mobile help button device **10** optionally has other attributes such as optionally being waterproof so it can be worn in a bath or shower. Because the mobile help button device **10** is designed to be operated by the subscriber under duress possibly including compromised physical or mental agility, the mobile help button device **10** is preferably designed to minimize operational complexity and likelihood of operator error. For example, in some embodiments the mobile help button device **10** includes only the call button **12** and no other user controls, and the call button **12** is preferably large with a tactile surface to facilitate its activation by the subscriber even if the subscriber's hand is trembling or the subscriber has vision difficulty, pain, or is otherwise debilitated.

[0020] FIG. **1** diagrammatically illustrates internal components of the mobile help button device **10**, including WiFi **20**, cellular **22**, a battery **24**, a Global Positioning System (GPS) receiver **26**, and an electronic processor **28** (e.g. a microprocessor or microcontroller). It will be appreciated that these various components may be variously integrally formed and/or mounted separately or as combined units in the housing of the mobile help button device **10**. For example, various groups of components **20**, **22**, **26**, **28** may be commonly mounted as a hybrid integrated circuit, monolithic integrated circuit, or so forth. The WiFi **20** and cellular **22** are suitably implemented as WiFi and cellular radios, i.e. WiFi and cellular modules or transceivers.

[0021] The WiFi radio **20** is configured to wirelessly communicate with a PERS base station **30** either directly or via an intermediate WiFi access point (AP). Instead of WiFi, the mobile help button device **10** may be in short range wireless communication with the base station **30** by another short range wireless communication link, such as a dedicated **900** MHz link. The base station **30** is located in the residence and is connected with the PERS **8** (e.g. with the call center) via a reliable communication link **31** such as a telephone landline. The base station **30** provides the mobile help button device **10** with low-cost communication with the PERS **8** when the subscriber is at his or her residence. Thus, the short range wireless communication of the mobile help button device **10** with the base station **30** has a range approximately coinciding with the spatial extent of the residence (and possibly its immediate environs, e.g. extending to encompass a neighboring house or an apartment floor above or below a residence apartment or so forth). Although the short range communication preferably provides coverage for the entire residence, it is contemplated that in some instances the short range communication may fail to provide such complete coverage and there may, for example, be one or two rooms of a large house that are not covered by the short range communication. For example, if the WiFi **20** provides the short range communication with the base station **30**, there may be one or two rooms, or portions thereof, that are outside of range of the WiFi hot spot of the residence.

[0022] The base station **30** includes a speaker **32** and a microphone **34**. Thus, the base station **30** comprises a speakerphone console **30** via which a PRA can directly speak with the subscriber. To this end, the base station **30** employs the communication link **31** to the PERS **8**, such as a landline telephone link (although another type of reliable wired or wireless link is also contemplated, such as a cable television cable link or so forth).

[0023] The cellular **22** is configured to wirelessly communicate with a cellular network, e.g. a cellular telephone (cellphone) network. This is diagrammatically indicated in FIG. **1** as communication between the cellular **22** and a cellular tower (i.e. cell tower) **36**. The cellular **22** of the mobile help button device **10** provides PERS service to the subscriber when the subscriber (or more particularly the mobile help button device **10**) is out-of-range of the in-residence PERS base station **30**. In this case the PRA cannot leverage the speaker **32** and microphone **34** of the base station **30** to speak with the subscriber; rather, in this "out-of-home" mode the speaker **14** and microphone **16** of the mobile help button device **10** is relied upon to support this conversation.

[0024] The electronic processor **28** is programmed to execute a PERS application **40**, which detects activation of the call button **12** (or detects another emergency call trigger such as an accelerometer signal indicative of a sudden fall) and transmits information to initiate an emergency call via the base station **30** (when in-residence) or via the cellular **22** (when out-of-residence) in response to the detected trigger. When using the cellular **22**, the PERS application **40** also operates the speaker **14** and microphone **16** to conduct conversation between the PRA and the subscriber. (By contrast, when in-residence this conversation is conducted by the base station **30**).

[0025] The illustrative PERS architecture here described with reference to FIG. **1** does not assume a homebound subscriber. Rather, PERS service continues to be provided even when the subscriber leaves the residence, via the cellular **22**. However, this raises an issue if the PRA wishes to send assistance to the subscriber's location, since the PRA cannot assume the subscriber is located at the residence.

[0026] Accordingly, when the PERS application **40** is activated, it invokes a locator application **42** which executes on the electronic processor **28** to cause the mobile help button device **10** to determine the location of the subscriber (or, more precisely, the location of the mobile help button device **10**). As described herein, the locator application **42** leverages various resources of the mobile help button device **10** to provide an accurate location. First, if the mobile help button device **10** is in short range wireless communication with the base station **30** (e.g. via the WiFi **20** or another short range wireless link such as a dedicated **900** MHz link) then the locator application **42** sets the location as a "home" location, i.e. the residence of the subscriber where the base station **30** is located.

[0027] On the other hand, if the mobile help button device **10** is not in short range wireless communication with the base station **30** then it cannot be concluded that the subscriber is in the residence. In this case, the mobile help button device **10** attempts to determine the location using location information collected by the mobile help button device **10**. This location information may, for example, include one or more of the following: WiFi access points (APs) in range of the WiFi **20**; cellular towers (such as the illustrative cell tower **36**) in range of the cellular **22**; and/or GPS information collected by the GPS receiver **26**. In some embodiments, the location information may be used directly to determine the location—for example, the GPS information collected by the GPS receiver **26** may be an actual location, e.g. in global latitude/longitude coordinates, and hence used directly as the determined location. In other embodiments, location cannot be directly determined from the location information—for example, identification of in-range WiFi APs and/or cell towers does not, by itself, provide an actual location in any global coordinate system. Even if some location information may provide actual location (e.g. a GPS location), it may be preferable to leverage all available location information to provide the most accurate location—thus, although the GPS may be in global coordinates other location information such as in-range WiFi APs and/or cell towers may be beneficially leveraged to provide a more accurate and/or definitive location. This also allows the location to be determined if insufficient GPS satellite signal is available to obtain an accurate GPS location, or if the mobile help button **10** does not include the illustrative GPS receiver **26**.

[0028] Accordingly, in some embodiments the mobile help button device **10** communicates with a Global Locator Service **44** via the cellular **22** to send the location information to the Global Locator Service **44** and to, in response, receive the location from the Global Locator Service **44**. The Global Locator Service **44** may, for example, be Skyhook™ (Boston, Mass., USA), which is a commercially available Global Locator Service that correlates detected cell towers or APs with geographical location. It is also contemplated to communicate with the Global Locator Service **44** by WiFi **20**, e.g. via a WiFi Access Point connected to the Internet (via, e.g., a home router or a WiFi/Cellular bridge).

[0029] The location application **42** is provided to the PERS application **40** which sends the location to the PERS **8** via the base station **30** or via the cellular **22**. (Alternatively, the locator application **42** may perform this transmission). The PERS application **40** preferably invokes the locator application **42** immediately upon start-up in response to pressing of the call button **12** (or in response to another indication of an emergency such as the triggering of a fall detector) in order to determine the current location. Additionally, in some embodiments, the locator application **42** is invoked at other times, for example on a predetermined cycle (e.g. every 15 minutes) in order to perform tracking by breadcrumbing (i.e. storing the locations determined over time). If this is done, then as a final "fall back", the location can be determined from the tracking if the mobile help button device **10** is not in short range wireless communication with the base station **30** and the location cannot be determined by collecting location information and sending the collected location information to the global locator service **44**. The location can be determined from the tracking as the last (i.e. most recent) location logged by the breadcrumbing. Alternatively, it is contemplated to estimate a current trajectory of the subscriber (or more specifically of the mobile help button device **10**) based on the last two or more locations logged by the breadcrumbing, e.g. assuming a linear or parabolic extrapolation of these last two or more locations to the current time. The breadcrumbing data (or at least the last one, two, or few locations of the breadcrumbing data) are stored locally in an electronic data storage (e.g. flash memory) of the mobile help button device **10**, and the breadcrumbing data optionally may also be transmitted to the PERS **8** via the base station **30** or cellular **22** so that the PERS **8** has (relatively) current location information for the subscriber in the event that communication with the mobile help button device **10** is lost entirely.

[0030] The locator application **42** thus provides a mechanism by which the current location of the subscriber (or, more particularly, of the mobile help button device **10**) can be determined regardless of whether the location is in-residence or out-of-residence. In a PERS architecture that assumes a homebound subscriber, the location accuracy achieved by

assuming the subscriber is in the residence is usually on the order of a few thousand square feet for a typical house, down to a few hundred square feet for a small apartment. GPS can generally provide greater location accuracy than this if the GPS satellite signals are strong enough, while location based on in-range WiFi AP or cell towers is typically roughly comparable with the locational accuracy obtained by assuming an in-residence location. Such locational accuracy is generally sufficient in the case of a homebound subscriber, since a typical home has only the subscriber as a residence or, if it has additional residents, they generally know the subscriber and will assist EMS personnel in locating the subscriber. Thus, locating the homebound subscriber to being in the residence is sufficient.

[0031] On the other hand, it is recognized herein that if the subscriber is out-of-residence then this level of locational accuracy may be insufficient. For example, locating the subscriber to an area on the order of a few hundred to a few thousand square feet may merely place the subscriber somewhere in a large department store, mall, or other congested location. The other people in this congested location generally do not know the subscriber, and may be unaware that the subscriber needs assistance. In such a case, EMS personnel may spend valuable time attempting to locate the subscriber within the area identified by the locator application **42**.

[0032] Accordingly, in some embodiments the mobile help button device **10** further includes an audio beacon **46**, e.g. comprising the speaker **14** operated by suitable programming of the electronic processor **28** to emit a loud beacon sound, e.g. a beeping sound or the like. The audio beacon **46** may, in various embodiments, be triggered by the subscriber, e.g. using the call button **12**, and/or remotely by the PRA via the cellular **22** (or, optionally, also via the base station **30**, although the beacon is less likely to be useful when the subscriber is in the residence). In some embodiments, the audio beacon **46** may be triggered anytime the subscriber presses the call button **12**. However, this is generally not preferable because the beacon may not be needed if the subscriber is calling for assistance but is not incapacitated—and, activation of the audio beacon **46** each time the call button **12** is pressed may be annoying and may discourage the subscriber from making a PERS call that should be made.

[0033] Accordingly, in some embodiments activation of the audio beacon **46** locally via the mobile help button **10** may require more complex actions. For example, in one embodiment the subscriber must press the call button **12** twice in rapid succession (or three times in rapid succession) in order to activate the audio beacon **46**. A disadvantage of this approach is that if the subscriber is becoming incapacitated, so that the audio beacon **46** should be activated, he or she may be unable to perform such rapid-succession repeated pressing of the call button **12**.

[0034] In another approach, the audio beacon **46** is activated at some time interval after the first pressing of the call button **12** unless the call button **12** is pressed a second time in order to abort the delayed activation of the audio beacon **46**. This approach has the advantage of enabling the audio beacon **46** to be activated by a single press of the call button **12**, albeit with some programmed delay, but allows the subscriber to abort activation of the audio beacon **46** before it starts if the subscriber is not incapacitated. The programmed delay is preferably chosen to be long enough to provide the subscriber with time to abort activation of the audio beacon **46** before it alarms, but short enough that the audio beacon **46** will be alarming by the time EMS personnel arrive in the event the subscriber is actually incapacitated. For example, a pre-programmed delay of between ten seconds and two minutes may be suitable in some embodiments, although shorter or longer delays are contemplated. Optionally, the pre-programmed delay may be a configurable parameter of the mobile help button device **10**.

[0035] It is also contemplated for the audio beacon **46** to be triggered by other events, such as by detection of a fall by a fall detector of the mobile help button device **10**. As previously mentioned, it is additionally or alternatively contemplated for the audio beacon **46** to be configured to be remotely triggered by the PRA via the cellular **22**.

[0036] With reference to FIG. **2**, an illustrative locator method suitably performed by the locator application **42** is described. In an operation **60** the locator application **42** is started. This can be due to its being invoked by the PERS application **40** responding to pressing of the call button **12** or another indication of an emergency (e.g. a detected fall). Alternatively, the start operation **60** may be triggered automatically, e.g. every five minutes to perform tracking. In an operation **62**, a check is performed to determine whether the mobile help button device **10** is in short range wireless contact with the base station **30** (e.g. via the WiFi **20**, or via a dedicated 900 MHz link or so forth). In a decision operation **64**, if the mobile help button device **10** is in short range wireless contact with the base station **30** then the location is set to "home" in an operation **66**. On the other hand, if the mobile help button device **10** is not in short range wireless contact with the base station **30** then flow passes to a location information gathering operation **72**, which may by way of illustration include an operation **72** in which GPS location information is acquired by the GPS receiver **26**, an operation **74** in which the WiFi **20** scans to locate any in-range WiFi APs, and/or an operation **76** in which the cellular **22** scans for any in-range cell towers. In an operation **80**, the cellular **22** connects to the Global Locator Service **44** (e.g. Skyhook™) sends the locator information (e.g. GPS, AP, and/or cell tower information), and receives the location from the Global Locator Service **44**. In an operation **82** performed in embodiments that include tracking, the breadcrumbing is updated with the "home" location **66** or the location received from the operation **80** contacting the Global Locator Service **44**. In an operation **84**, the determined location is output.

[0037] In embodiments that include tracking, if the operation **80** fails to determine the location via the Global Locator Service **44** (e.g. because of a lost cellular connection), or the Global Locator Service being down; or, more generally, if the location is unable to be determined as either the "home" location **66** in response to being in short range wireless contact with the base station **30**, or from the location information generated by the information gathering operation **70**), then in response to such failure **90** the location is determined (or estimated) from the breadcrumbing in an operation **92** (e.g. as the last breadcrumbed location, or based on a trajectory estimated from two or more last breadcrumbed locations). This location is then the location output in the operation **84** (optionally output with a warning that the location may not be current).

[0038] The invention has been described with reference to the preferred embodiments. Modifications and alterations may occur to others upon reading and understanding the preceding detailed description. It is intended that the invention be construed as including all such modifications and

alterations insofar as they come within the scope of the appended claims or the equivalents thereof.

1. A mobile help button device comprising:

a help button with WiFi and cellular communication; and

a global positioning system (GPS) receiver;

wherein the mobile help button device is programmed to perform a locator method including:

attempting to wirelessly connect with a base station;

acquiring WiFi access point (AP), cellular tower, and GPS information; and

determining a location (i) as a home location if the attempt to wirelessly connect with the base station is successful or (ii) based on the WiFi AP, cellular tower, and GPS information if the attempt to wirelessly connect with the base station is unsuccessful.

2. The mobile help button device of claim **1** wherein the determining comprises:

determining the location (ii) by communicating the WiFi AP, cellular tower, and GPS information to a global locator service via cellular communication if the attempt to wirelessly connect with the base station is unsuccessful.

3. The mobile help button device of claim **1** wherein the locator method further comprises:

tracking location over time by breadcrumbing the determined location.

4. The mobile help button device of claim **3** wherein the determining comprises:

determining the location (ii) by attempting to communicate with a global locator service via cellular communication or the WiFi AP connected to the Internet and (ii)(a) communicating the WiFi AP, cellular tower, and GPS information to the global locator service and receiving the location from the global locator service if the attempt to communicate with the global locator service is successful and (ii)(b) determining the location from the breadcrumbing if the attempt to communicate with the global locator service is unsuccessful.

5. The mobile help button device of claim **1** wherein the operation of attempting to wirelessly connect with the base station is performed using WiFi.

6. The mobile help button device of claim **1** further comprising:

an audio beacon.

7. A mobile help button device configured for short-range wireless communication with a base station of a Personal Emergency Response System (PERS), the mobile help button device comprising:

a call button;

a cellular transceiver configured to communicate with a cellular network;

a global positioning system (GPS) receiver; and

an electronic processor programmed to cause the mobile help button device to perform a locator method to determine a location of the mobile help button device, the locator method including:

if the mobile help button device is in short-range wireless communication with the base station, determining the location as a home location; and

if the mobile help button device is not in short-range wireless communication with the base station, attempting to determine the location using location information collected by the mobile help button device including at least cellular tower information collected by the cellular transceiver and GPS information collected by the GPS receiver.

8. The mobile help button device of claim **7** wherein attempting to determine the location using location information collected by the mobile help button device includes attempting to wirelessly send the collected location information to a global locator service and wirelessly receive the location from the global locator service.

9. The mobile help button device of claim **8** further comprising:

a WiFi transceiver;

wherein the collected location information includes WiFi access point (AP) information collected by the WiFi transceiver.

10. The mobile help button device of claim **9** wherein the mobile help button device is configured for short-range wireless communication with the base station of the PERS via the WiFi transceiver.

11. The mobile help button device of claim **7** wherein the locator method further includes:

tracking the mobile help button device over time by breadcrumbing locations determined as the home location or determined using location information collected by the mobile help button device; and

if the attempt to determine the location using location information collected by the mobile help button device is unsuccessful, determining the location from the tracking.

12. The mobile help button device of claim **7** wherein the locator method further includes:

detecting a trigger generated by the mobile help button device or received from the PERS; and

activating an audio beacon in response to detecting the trigger generated by the mobile help button device or received from the PERS.

13. The mobile help button device of claim **7** further comprising:

a speaker and microphone built into the mobile help button device, the electronic processor further programmed to cause the mobile help button device to support conversation with the PERS using the speaker and microphone.

14. The mobile help button device of claim **7** wherein the mobile help button device includes no other user control besides the call button.

15. The mobile help button device of claim **7** wherein the locator method further includes:

communicating the determined location to the PERS via one of short-range wireless communication with the base station and the cellular transceiver.

16. A locator method performed by a mobile help button device with cellular communication, the locator method comprising:

determining whether the mobile help button device is in short range wireless communication with a base station;

setting the location to a home location if the mobile help button device is in short range wireless communication with the base station; and

if the mobile help button device is not in short range wireless communication with the base station, determining the location by collecting location information including at least information on cellular towers in range of the

mobile help button device and sending the collected location information to a global locator service via cellular communication.

17. The locator method of claim **16** wherein the mobile help button device has WiFi and the collecting further includes collecting location information including information on WiFi access points (APs) in range of the mobile help button device.

18. The locator method of claim **16** wherein the mobile help button device has a Global Positioning System (GPS) receiver and the collecting further includes collecting GPS information using the GPS receiver.

19. The locator method of claim **16** further comprising:

tracking the mobile help button device over time by breadcrumbing locations determined by the locator method; and

determining the location from the tracking if the mobile help button device is not in short range wireless communication with the base station and the location cannot be determined by collecting location information and sending the collected location information to the global locator service.

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