Title: MEDICAL DEVICE LOCATION-BASED ASSOCIATION TO A PATIENT

Abstract: Medical devices within a proximity to a patient are discovered. The discovered devices are displayed within a graphical user interface of a computing device. Data that is derived from response to user-generated input, via the graphical user interface, is received that selects one or more of the medical devices. The selected medical devices are queried to determine whether the selected medical devices should be associated with the patient. In response to the querying, an association confirmation is received from a selected medical device. The medical device that received association confirmation is then associated with the patient.
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Medical Device Location-Based Association To A Patient

TECHNICAL FIELD

[0001] The subject matter described herein relates to detection of electronic devices, in particular, the detection of medical devices in a proximity to a patient.

BACKGROUND

[0002] In medical care, medical devices, used in patient treatment, are often assigned to a single patient, in accordance with a treatment plan. In a health care facility, with many medical devices and many patients, medical devices are moved from patient to patient as needed by physicians, or as patients enter or leave the facility or treatment area. The association of medical devices with patients can be done by charts, tags, databases, etc. The association of medical devices with patients can be referred to by physicians to prepare for operations, determine conflicts with other medical devices that may be needed, familiarize the physician with the current state of patient care, and the like. Also, the association of medical devices can be done at the device level, e.g. admitting a patient using a patient ID on the device, or can be done centrally in an information technology system, e.g. assigning a device at a certain location to the patient. By properly associating medical devices with patients, an accurate electronic patient record can be maintained.

SUMMARY

[0003] In a first aspect, medical devices within a proximity to a patient are discovered. The discovered devices are displayed within a graphical user interface of a
computing device. Data that is derived from response to user-generated input, via the graphical user interface, is received that selects one or more of the medical devices. The selected medical devices are queried to determine whether the selected medical devices should be associated with the patient. In response to the querying, an association confirmation is received from a selected medical device. The medical device that received association confirmation is then associated with the patient.

[0004] In some variations, the discovering of the medical devices includes wirelessly transmitting a signal from the medical device to a base location. The distance from the medical device to the base location can be determined based on the strength of the signal. An inventory of medical devices with in the proximity can be compiled and stored in a database. Also, the medical device can be excluded from the inventory based on the medical device being outside the proximity.

[0005] In another variation, a first signal can be transmitted from the base location to a distance that defines the proximity. Second signals from the medical devices within the proximity can be received. An inventory of the medical devices within the proximity can be compiled from the received second signals. The inventory can be stored in a database.

[0006] In other variations, the proximity can correspond to a physical boundary of a patient treatment room and the medical device can be associated with an out-of-bounds status upon discovering the medical device to be outside the proximity.

[0007] In another variation, it can be confirmed by a user that the medical device is not being used by another patient when the device is within a predefined distance of an edge of the proximity and when the medical device includes a parameter
indicating that medical device is a non-fixed device. If the medical device is being used by another patient, the medical device can be removed from the displayed medical devices.

[0008] In another variation, the medical device have memory storing parameters including type, serial number, version, room identifier, other location identifier, and fixed or non-fixed status.

[0009] In yet another variation, each discovered medical device can be compared to associated medical devices and when any of the medical devices are already associated with another message a conflict message can be transmitted.

[0010] In another variation, the proximity is verified by transmitting a proximity verification signal that initiates a visual indication of all medical devices within the proximity. Also, the association can be removed upon the medical device being discovered outside the proximity.

[0011] In another variation, the confirmation can be provided by a user engaging an actuator connected to the selected medical device.

[0012] In other variations, the associating is executed by a first computing device and the discovered medical devices can be displayed within a second graphical user interface of a second computing device.

[0013] In yet another variation, the medical devices can be discovered by wireless communication, which can be unidirectional. Association between the medical device and the patient can be established based in part on receiving, by the medical device, the wireless communication, or by analyzing the signal strength of the wireless communication received by the medical device.
The current subject matter provides many technical advantages. For example, the accurate location, type, state, etc. of medical devices proximate to a patient can be determined. Confirmation of the detected medical devices to be associated with the patient can easily be performed, reducing the risk of conflicting or unnecessary medical devices being connected to a patient. Also, accurate association between medical devices and patients prevents the inadvertent mixing of patient data or the loss of patient data. Additionally, unnecessary medical devices can easily be identified and removed from the patient.

The details of one or more variations of the subject matter described herein are set forth in the accompanying drawings and the description below. Other features and advantages of the subject matter described herein will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

FIG. 1 is a diagram illustrating a patient with a proximity that includes a number of medical devices;

FIG. 2 is a diagram illustrating medical devices associated or unassociated with the patient;

FIG. 3 is a process flow diagram illustrating associating medical devices with the patient;

FIG. 4 is a process flow diagram illustrating compiling an inventory of associated medical devices;
FIG. 5 is a process flow diagram illustrating setting an out-of-bounds status in the medical device;

FIG. 6 is a process flow diagram illustrating confirming that mobile medical devices are not associated with another patient; and

FIG. 7 is a process flow diagram illustrating transmission of a conflict message if the medical devices are associated with another patient.

DETAILED DESCRIPTION

The current subject matter is directed to methods, systems, apparatus, articles / computer program products for identifying medical devices connected to a patient.

In an increasingly advanced medical care environment, it is becoming ever more critical to quickly and accurately determine the number and type of medical devices that are in use by a patient at any one time. While some devices have this capability built in, others may not, making this determination challenging. The current subject matter describes methods and apparatus for determining the number and type of medical devices in a given proximity to a patient, and providing confirmation before associating the medical devices in use with the patient in computerized record keeping systems. This allows medical devices to effectively be connected to a network, even if they were not originally designed to be connected in such a way. Also, some devices can be optimized to allow for easy patient association, e.g. supporting a bar-code reader that can scan a patient ID, whereas other systems do not have these optimizations.
As used in the application, the term "patient" can refer to any biological entity, e.g. persons or animals, and is not intended to be limiting in any way to persons under medical care or in a medical treatment facility. Also, the term "medical device" can refer to any device related to the treatment and wellness of a patient, irrespective of the function of the device, and is not intended to be limiting in any way to particular types of medical devices, unless otherwise specified.

FIG. 1 is a diagram illustrating a patient 110 with a proximity 120 that includes a number of medical devices 130. The current subject matter describes locating and associating medical devices 130, 140, 150 within the proximity to the patient 110. To first locate the medical devices 130, the proximity 120 must be determined. For example, the proximity 120 can be a predetermined range of a transmitting device (not shown), a predetermined radius from the patient 110, or the proximity 120 defined at least in part by physical constraints, i.e. walls, ceilings, floors, etc. that correspond to a physical boundary of a patient treatment room. In the example of FIG. 1, some of the medical devices 130, 140, 150, can be within the proximity 120, whereas other medical devices 160, 170 are not.

In another implementation, the discovering of medical devices 130 within the proximity 120 can be based upon wirelessly transmitting a signal from the medical device 130 to a base location, which can correspond to the location of the patient 110. After the signal is transmitted then, based on the strength of the signal, the distance from the medical device 130 to the base location can be determined. Positional information can be determined by using the strength of the signal, triangulation, or both. Once the position and/or distance relative to the patient is determined, the medical device
can be included or excluded as a candidate for association with the patient. For example, if the distance exceeds a predetermined boundary, e.g. the proximity 120, then that information can be used in making a decision in whether or not to associate the medical device 130 with the patient 110.

[0028] Of the medical devices that are in the proximity 120, each of the medical devices 130 can have varying degrees of association with the patient 110. Association with the patient 110 can be used to associate physiological data that is generated by a medical device with the patient 110. This physiological data from multiple medical devices that are associated with the patient 110 can be stored by a server or another medical device in a unified record for the patient 110, either as separate distinct data sets or combined into a single data set.

[0029] The medical device 130 being in the proximity 120 of the patient 110 is not sufficient to associate the medical device 130 with the patient 110. The caregiver can also be required to provide confirmation that the medical device 130 is to be associated with the patient 110. The confirmation can take the form of user-generated input to the computing device, GUI, etc. In another implementation, the confirmation can be provided via engagement, by the caregiver or other user, of an actuator operably connected to the selected medical device. The actuator can be, e.g. a button, switch, knob, etc. For example, the medical device 130 can be confirmed to be associated with the patient 110, whereas the medical device 140 can be connected to the patient 110, but not yet confirmed to be associated with the patient 110. The medical device 150 can be within the proximity 120; however it does not have to be associated with the patient 110.
[0030] Not all medical devices that can be discovered are necessarily within the proximity 120. The medical devices 160 and 170 can be either outside of the proximity, and therefore not associated with the patient 110, or they can be associated with another patient. In another implementation, the association with the patient 110 in the proximity can be removed, or recommended to be removed, upon the medical device being discovered outside the proximity 120, i.e. the medical device is removed from the area. The process by which the proximity 120 to the patient 110 is determined and the association of the medical devices with the patient 110 is made is described in greater detail, below.

[0031] FIG. 2 is a diagram illustrating medical devices associated or unassociated with the patient 110. FIG. 2 is similar to FIG. 1, but showing more detail about the patient environment and the medical devices that are found within the patient environment. In the example illustrated in FIG. 2, there are two patient care areas, care area for patient A 210 and care area for patient B 220. As shown, the proximity corresponding to patient A 110 approximately corresponds to the care area for patient A 210.

[0032] In addition to the medical devices, there can also be a workstation 230 present that can be used, among other things, to monitor the medical devices within the proximity to the patient 110. The workstation 230 can be, e.g. a computer terminal, a dedicated display having a graphical user interface (GUI), etc. The workstation 230 and each medical device can have a transceiver that enables wireless transmission of signals to and/or from the medical devices in the proximity. The transceivers can be, e.g. radio-frequency identifiers, BLUETOOTH enabled, electronic leashes, etc. In another
implementation, some of the medical devices can already be connected to a network via wireless connection, physical connection, e.g. ETHERNET, local-area-network, etc. The network connection can alternatively be used to determine if the medical device is within the proximity to the patient 110, for example, if the medical device is plugged into a port in the care area for patient A210, then that medical device can be a candidate for being associated with patient A110. In another implementation, the wireless communication can be unidirectional, that is that the medical devices include only a wireless receiver and not a wireless transmitter. One example of the unidirectional wireless communication implementation can be a medical device 130 that receives a wireless signal, e.g. strength-limited in range or stopped by the physical boundaries of the patient treatment room, e.g. the care area for patient A210. Either by analysis of the signal strength, or just by virtue of the fact that a signal was received, it can be determined or inferred that the medical device 130 is a candidate for association with the patient A110. Optionally, after the wireless signal is received, there can be an indicator on the medical device 130, e.g. visual as in an LED, audio as in a beeping speaker, etc. to indicate the presence of the medical device 130. Also, as described above, the medical devices 130 can be connected to a central computer system via a wired network (not shown). The medical device 130 can then transmit an indication of the receipt of the unidirectional wireless signal via wired signal through the network.

[0033] FIG. 3 is a process flow diagram 300 illustrating associating medical devices with the patient 110. At 310, each of the medical devices within the proximity of a patient 110 can be discovered. As described above, the discovering can be performed by sending a wireless transmission from, e.g. the workstation 230, a transmitter located at
the patient 110 location, etc. to e.g. the medical devices, the transceivers, or identifying
the medical devices by their physical or virtual access points to a network, etc. The
medical devices can then return a signal indicating that they are candidates for
association with the patient 110. In another embodiment, the proximity can be
determined and/or verified, by transmitting a proximity verification signal that initiates a
visual indication of all medical devices within the proximity. For example, the medical
device can have a light-emitting diode (LED) that illuminates upon the medical devices
receiving the proximity verification signal.

[0034] At 320, upon receipt of the returned signals, the discovered medical
device can be displayed on a GUI of a computing device. The computing device can be,
e.g. the workstation 230, a display located on the medical device, or a mobile device such
as a smartphone, tablet computer, etc.

[0035] At 330, the computing device can receive data in response to user-
generated input, via the graphical user interface, selecting one or more of the medical
device. The data can be data that specifies selections or exclusions of medical devices
for association with the patient 110. The user-generated input can be, e.g. a touch on a
touch-screen display, a mouse click, checking a checkbox, etc. The selecting can be used
to perform, in turn, confirmation in associating each candidate medical device with the
patient 110. Referring back to FIG. 2, the caregiver could receive a list of medical
device 130, 140, and 150 and examine the medical devices one at a time to confirm or
deny their association with patient A 110.

[0036] At 340, each of the selected medical device can be queried to
determine whether each such medical device should be associated with the patient 110.
The querying can take the form of, e.g. determining already extant associations, providing information about the medical device to the caregiver, etc. Also, the querying can include displaying the results of the querying to the caregiver to aid in making a determination whether to confirm the association between the medical device and the patient 110.

[0037] At 350, the computing device can receive, in response to the querying, an association confirmation from at least one of the selected medical devices. As described above, the confirmation can be an affirmative action taken by the caregiver to confirm that the candidate medical device, discovered in 310, is to be associated with the patient 110.

[0038] At 360, each selected medical device, from which an association confirmation was received, can be associated with the patient 110. The association, as described in FIG. 1, can include storing the record of the association in the memory of the computing device, the medical device, and/or a server. Once associated, the medical device will be displayed as associated if discovered by another workstation 230 or computing device.

[0039] The displaying of the locations and/or associations of medical devices, or utility programs managing the detection/association of the medical devices can be implemented by graphical user interfaces on one or more devices. In another implementation, 310, 330, 340, 350, and 360 are executed on a first computing device, e.g. the workstation 230, which can have a first GUI (not shown). A second computing device, perhaps used by a caregiver, e.g. a mobile device, tablet, smartphone, etc. can
have a second GUI (not shown), that can execute the displaying at 320 of the discovered medical devices.

[0040] FIG. 4 is a process flow diagram 400 illustrating compiling an inventory of associated medical devices. In the implementation shown in FIG. 4, the discovering in 310 can include additional features. At 410, a first signal can be transmitted from a base location to a distance that defines the proximity, e.g. where the first signal is limited by walls, floors, etc. of a patient care area. The base location can be the workstation 230, a transmitter at the patient 110 location, etc. The distance that defines the proximity can be, e.g. predefined as described above, determined after the receiving of signals based on calculated distances, etc.

[0041] At 420, a second signal can be received from the medical devices within the proximity. The first signal and the second signal can be separated by frequency, phase, or amplitude in order to distinguish the signals. Also, each medical device can have unique second signals to distinguish them from each other.

[0042] At 430, an inventory of the medical devices can be compiled based on the received second signals. The inventory can include devices that are unassociated, associated, or unassociated but awaiting confirmation. Depending on the medical devices being within or outside of the proximity, the medical devices can be included or excluded from the inventory.

[0043] At 440, the inventory can be stored in a database or other computer memory. The inventory can be present in e.g. the workstation 230, a mobile device, a server, the memory of the medical device, etc. The inventory can periodically, or on-demand, be refreshed by a user or by the computer program executing the associating
program. Older versions of the inventory can also be stored in the database to provide a
record of changes in associations of the medical devices.

[0044] FIG. 5 is a process flow diagram 500 illustrating setting an out-of-bounds status in the medical device. FIG. 5 is similar to FIG. 3, but includes the feature of designating the medical device as being out-of-bounds if detected, but determined to be outside the proximity. At 510, once the medical device is confirmed and associated with the patient 110, if it has the out-of-bounds status present, then should another discovering occur at a later point in time, the caregiver can be alerted to the fact that there is a medical device which is associated with the patient 110, but outside the proximity. Such status identification can be helpful in tracking down devices that have been misplaced from the designated patient 110.

[0045] FIG. 6 is a process flow diagram 600 illustrating confirming that non-fixed medical devices are not associated with another patient 110. In one implementation, there can be parameters, i.e. an information tag, to aid in determining what kind of medical devices are within the proximity and whether or not the medical devices should be associated with the patient 110. The medical devices can have computer memory that stores parameter including: type, serial number, version number, version, room identifier, other location identifiers, fixed or non-fixed status, etc. The information tag can be, e.g. IBEACON, RFID, etc. Accordingly, the reader for the information tag can be integrated into the workstation 230 or any other computing device, e.g. laptop computer, tablet computer, mobile device, etc.

[0046] At 610, it can be confirmed by a user that when the device is within a predefined distance of an edge of the proximity, and when the medical device includes a
parameter indicating that the medical device is a non-fixed device, that the medical device is not being used by another patient 110. The confirmation can take the form of e.g. manually verifying, referencing a database, etc.

[0047] At 620, the medical devices can be removed from the displayed medical devices if the medical devices are being used by another patient 110. Also, this can include overriding the association in the event that the medical device has an associated patient already, but in reality the patient is no longer connected to the medical device. The removing can include, e.g. removing the already associated medical devices from a list or table, unchecking them from a checklist, etc.

[0048] FIG. 7 is a process flow diagram 700 illustrating transmission of a conflict message if the medical devices are associated with another patient 110 FIG. 7 is similar to FIG. 3, but includes features describing providing a conflict message to the caregiver to aid in determining if the medical device should be associated with the patient 110. At 710 the discovered medical devices can be compared to the list of associated medical devices.

[0049] At 720, the conflict message can be transmitted to the computing device, medical device, or other device, indicating that the discovered medical device is already associated with another patient 110. After the conflict message is transmitted, it can be determined either manually or automatically, whether or not to remove the medical device from the list of discovered medical devices.

[0050] One or more aspects or features of the subject matter described herein may be realized in digital electronic circuitry, integrated circuitry, specially designed ASICs (application specific integrated circuits), computer hardware, firmware, software,
and/or combinations thereof. These various implementations may include implementation in one or more computer programs that are executable and/or interpretable on a programmable system including at least one programmable processor, which may be special or general purpose, coupled to receive data and instructions from, and to transmit data and instructions to, a storage system, at least one input device (e.g., mouse, touch screen, etc.), and at least one output device.

[0051] These computer programs, which can also be referred to as programs, software, software applications, applications, components, or code, include machine instructions for a programmable processor, and can be implemented in a high-level procedural language, an object-oriented programming language, a functional programming language, a logical programming language, and/or in assembly/machine language. As used herein, the term "machine-readable medium" (sometimes referred to as a computer program product) refers to physically embodied apparatus and/or device, such as for example magnetic discs, optical disks, memory, and Programmable Logic Devices (PLDs), used to provide machine instructions and/or data to a programmable data processor, including a machine-readable medium that receives machine instructions as a machine-readable signal. The term "machine-readable signal" refers to any signal used to provide machine instructions and/or data to a programmable data processor. The machine-readable medium can store such machine instructions non-transitorily, such as for example as would a non-transient solid state memory or a magnetic hard drive or any equivalent storage medium. The machine-readable medium can alternatively or additionally store such machine instructions in a transient manner, such as for example as
would a processor cache or other random access memory associated with one or more physical processor cores.

[0052] To provide for interaction with a user, the subject matter described herein can be implemented on a computer having a display device, such as for example a cathode ray tube (CRT) or a liquid crystal display (LCD) monitor for displaying information to the user and a keyboard and a pointing device, such as for example a mouse or a trackball, by which the user may provide input to the computer. Other kinds of devices can be used to provide for interaction with a user as well. For example, feedback provided to the user can be any form of sensory feedback, such as for example visual feedback, auditory feedback, or tactile feedback; and input from the user may be received in any form, including, but not limited to, acoustic, speech, or tactile input. Other possible input devices include, but are not limited to, touch screens or other touch-sensitive devices such as single or multi-point resistive or capacitive trackpads, voice recognition hardware and software, optical scanners, optical pointers, digital image capture devices and associated interpretation software, and the like.

[0053] The subject matter described herein may be implemented in a computing system that includes a back-end component (e.g., as a data server), or that includes a middleware component (e.g., an application server), or that includes a front-end component (e.g., a client computer having a graphical user interface or a Web browser through which a user may interact with an implementation of the subject matter described herein), or any combination of such back-end, middleware, or front-end components. The components of the system may be interconnected by any form or medium of digital data communication (e.g., a communication network). Examples of
communication networks include a local area network ("LAN"), a wide area network ("WAN"), and the Internet.

[0054] The computing system may include clients and servers. A client and server are generally remote from each other and typically interact through a communication network. The relationship of client and server arises by virtue of computer programs running on the respective computers and having a client-server relationship to each other.

[0055] The subject matter described herein can be embodied in systems, apparatus, methods, and/or articles depending on the desired configuration. The implementations set forth in the foregoing description do not represent all implementations consistent with the subject matter described herein. Instead, they are merely some examples consistent with aspects related to the described subject matter. Although a few variations have been described in detail above, other modifications or additions are possible. In particular, further features and/or variations can be provided in addition to those set forth herein. For example, the implementations described above can be directed to various combinations and subcombinations of the disclosed features and/or combinations and subcombinations of several further features disclosed above. In addition, the logic flow(s) depicted in the accompanying figures and/or described herein do not necessarily require the particular order shown, or sequential order, to achieve desirable results. Other implementations may be within the scope of the following claims.
WHAT IS CLAIMED IS:

1. A method comprising:
   discovering each of a plurality of medical devices within a proximity of a patient;
   causing the discovered plurality of medical devices to be displayed within a
   graphical user interface of a computing device;
   receiving, data derived responsive to user-generated input, via the graphical user
   interface, selecting one or more of the medical devices;
   querying the selected one or more medical devices to determine whether each
   such medical device should be associated with the patient;
   receiving, in response to the querying, an association confirmation from at least
   one of the one or more selected medical devices; and
   associating each selected medical device, from which an association confirmation
   was received, with the patient.

2. The method of claim 1, wherein the discovering further comprises:
   wirelessly transmitting a signal from the medical device to a base location;
   determining the distance from the medical device to the base location based on
   the strength of the signal;
   compiling, based on the determining, an inventory of the medical devices within
   the proximity; and
   storing the inventory in a database.

3. The method of claim 2, wherein the medical device is excluded from the
   inventory based on the medical device being outside the proximity.

4. The method of claim 1, wherein the discovering further comprises:
   transmitting a first signal, from a base location, to a distance that defines the
   proximity;
   receiving a second signal from the medical devices within the proximity;
compiling, from the received second signals, an inventory of the medical devices within the proximity; and
storing the inventory in a database.

5. A method as in any of the preceding claims, wherein the proximity corresponds to a physical boundary of a patient treatment room.

6. A method as in any of the preceding claims, wherein the medical devices comprise memory storing parameters selected from a group consisting of: type, serial number, version, room identifier, other location identifier, and fixed or non-fixed status.

7. A method as in any of the preceding claims, further comprising:
associating the medical device with an out-of-bounds status upon the medical device being discovered to be outside the proximity.

8. A method as in any of the preceding claims, further comprising:
confirming, by a user, when the device is within a predefined distance of an edge of the proximity, and when the medical device includes a parameter indicating that the medical device is a non-fixed device, that the medical device is not being used by another patient; and
removing the medical device from the displayed plurality of medical devices upon the confirmation that the medical device is being used by another patient.

9. A method as in any of the preceding claims, further comprising:
comparing each discovered medical device to associated medical devices; and transmitting a conflict message, based upon the comparing, when any of the medical devices are already associated with another patient.
10. A method as in any of the preceding claims, wherein the proximity can be verified by transmitting a proximity verification signal that initiates a visual indication of all medical devices within the proximity.

11. A method as in any of the preceding claims, wherein association is removed upon the medical device being discovered outside the proximity.

12. A method as in any of the preceding claims, wherein the confirmation is provided via engagement, by a user, of an actuator operably connected to the selected medical device.

13. A method as in any of the preceding claims, wherein the causing, the receiving data derived responsive to user-generated input, the querying, the receiving in response to the querying, and the associating, is executed by a first computing device, and the discovered plurality of medical devices are displayed within a second graphical user interface of a second computing device.

14. A method as in any of the preceding claims, wherein the discovering is performed via wireless communication with at least one of the medical devices.

15. The method of claim 14, wherein the wireless communication is unidirectional.

16. The method of claim 15, wherein association between the medical device and the patient is established based in part on receiving, by the medical device, the wireless communication.

17. The method of claim 15, wherein association between the medical device and the patient is established based in part on analyzing, by the medical device, signal strength of the wireless communication received by the medical device.
18. A non-transitory computer program product storing instructions which, when executed by at least one data processor forming part of at least one computing device, implement a method as in any of the preceding claims.

19. A system comprising:
   at least one data processor; and
   memory storing instructions which, when executed by the at least one data processor, implement a method as in any of claims 1-17.
Fig. 2
310. Discovering medical devices in a proximity to a patient

320. Displaying discovered medical devices

330. Receiving data selecting a discovered medical device

340. Determining whether to associate the selected medical device with the patient

350. Receiving association confirmation from a selected medical device

360. Associating each confirmed selected medical device

Fig. 3
Fig. 4

410 Transmitting a signal to define a proximity

420 Receiving a second signal from the medical devices in the proximity

430 Compiling an inventory of the medical devices in the proximity

440 Storing the inventory in a database
310 Discovering medical devices in a proximity to a patient
320 Displaying discovered medical devices
330 Receiving data selecting a discovered medical device
340 Determining whether to associate the selected medical device with the patient
350 Receiving association confirmation from a selected medical device
360 Associating each confirmed selected medical device
510 Associating each confirmed selected medical device with an out of bounds status if outside proximity

Fig. 5
Discovering medical devices in a proximity to a patient

Displaying discovered medical devices

Confirming that a non-fixed medical device is not being used by another patient

Removing the non-fixed medical device from displayed medical devices if being used by another patient

Receiving data selecting a discovered medical device

Determining whether to associate the selected medical device with the patient

Receiving association confirmation from a selected medical device

Associating each confirmed selected medical device
700

310 Discovering medical devices in a proximity to a patient

320 Displaying discovered medical devices

710 Comparing discovered medical devices to associated medical devices

720 Transmitting a conflict message if discovered medical devices are associated with another patient

330 Receiving data selecting a discovered medical device

340 Determining whether to associate the selected medical device with the patient

350 Receiving association confirmation from a selected medical device

360 Associating each confirmed selected medical device

Fig. 7
A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F19/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<td>X</td>
<td>US 2011/202371 AI (DARGUESSE FEDERIC [FR] ET AL) 18 August 2011 (2011-08-18) abstract paragraphs [0028], [0029], [0041], [0050] - [0051], paragraphs [0054], [0058], [0060] - [0062], [0069] - [0073] claims 6,7 figure 1</td>
<td>1-19</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
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Date of the actual completion of the international search: 28 August 2015

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Guingalte, Abderrahim
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