(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 359 842 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
06.05.2009 Bulletin 2009/19

(21) Application number: **02718968.7**

(22) Date of filing: **13.02.2002**

(51) Int Cl.:
A61B 5/00 *(2006.01)*

(86) International application number:
PCT/US2002/004331

(87) International publication number:
WO 2002/064032 (22.08.2002 Gazette 2002/34)

(54) **PATIENT MONITORING AREA NETWORK**

PATIENTENÜBERWACHUNGSBEREICHSNETZ

R SEAU DE ZONE DE SURVEILLANCE DES PATIENTS

(84) Designated Contracting States:
DE FR GB IT

(30) Priority: **14.02.2001 US 268770 P**

(43) Date of publication of application:
12.11.2003 Bulletin 2003/46

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(56) References cited:
WO-A-00/36900
WO-A-01/80731
WO-A-99/44494
US-A- 5 417 222
US-A- 5 564 429
US-A- 5 579 001
US-A- 5 944 659
US-A- 6 167 258
US-A1- 2001 049 470
US-B1- 6 315 719
US-B1- 6 396 416
US-B1- 6 416 471

EP 1 359 842 B1

Printed by Jouve, 75001 PARIS (FR)

Description

1. Field of the Invention

[0001] This invention relates generally to the field of medical devices and more particularly to a wireless data gathering and transmission system to be used with patients receiving treatment in a hospital.

2. Background of the Invention

[0002] In a typical patient monitoring environment several electrodes or sensors are attached to a patient and then connected through wires to a Patient Monitor Processor as depicted in Figure 1. In an operating room, for example, wires from five, six or ten electrocardiogram (EKG) electrodes, an SpO2 sensor, a CO2 sensor, one, two or four pressure transducers, a pressure cuff, one or more temperature transducers and EEG electrodes may have to be connected between the patient and the Patient Monitoring Processor. This presents a particularly complex cable management problem for the attending physician or nurse. Considerable time can be consumed in disentangling the patient when they must be disconnected or transferred to another area of the hospital. Ideally, a reduction or elimination of all of the cable connections between the patient and the Patient Monitor Processor could be achieved. This could be effectively accomplished by the use of two way wireless transmission and reception between one or more Patient Connected Devices and the Patient Monitor Processor while using the same underlying wireless technology.

[0003] Wireless data acquisition systems are well known in the biomedical area. For example, U.S. Patent No. 5,704,351 issued to Mortara discloses a multiple channel biomedical digital telemetry transmitter. Mortara teaches an eight channel biomedical transmitter specifically directed to an electrocardiogram (EKG) signal transmission in the 902 to 928 MHz band. The Mortara device includes input circuitry and an analog to digital converter which receives the input signal from an EKG electrode and converts it to a digital signal which is inputted to a microprocessor. The microprocessor then converts the digital signal to a serial digital output signal which is used to frequency modulate the radio frequency carrier signal for telemetry transmission. The carrier frequency is adjustable within the 902 to 928 MHz band by two manual frequency setting switches. The use of these manual switches is the only adjustment available on the Mortara device and is capable only of manually setting the specific frequency within the 902 to 928 MHz band. The input circuitry and analog to digital converter are not adjustable or adaptable to accept different input signal characteristics. Further, the Mortara device cannot be adjusted by programming or otherwise to operate in any other frequency band. Finally, the Mortara device is only a transmitter and is unable to receive RF or other signals to control its operation.

[0004] Similarly, U.S. Patent No. 5,755,230, issued to Schmidt et al. discloses a device for monitoring a physiological signal, in particular an EEG, and transmitting the signal by RF to a receiver. Like Mortara, the Schmidt et al. device cannot be modified or adjusted to receive inputs from different physiological sensors.

[0005] U.S. Patent No. 5,579,775, entitled DYNAMIC CONTROL OF A PATIENT MONITORING SYSTEM, issued to Dempsey discloses a patient monitoring system with a telemetry subsystem which monitors and transmits an RF signal representing the signals it receives from one or more physiological monitoring instruments. Unlike Mortara and Schmidt et al., Dempsey teaches a receiving subsystem which can receive RF signals in a backchannel arrangement in order to control the operation of the system. However, Dempsey does not include the capability to adjust or modify the input by programming or otherwise in response to different physiological signals. The device relies on separate monitoring sections in order to accommodate different physiological signals such as EEG, EKG and SpO2.

[0006] U.S. Patent No. 5,417,222, also issued to Dempsey, discloses a portable processor which may be interconnected to a telemetry monitor at the I/O port. The Dempsey '222 device includes a telemetry monitor comprising a physiological monitor which receives selected physiological signals indicating a specific physiological condition of the patient. The physiological monitor is a specific type of monitor that reads signals of a specific physiological function such as EKG, for example. In the event that a different physiological function is to be monitored such as EEG a different physiological monitor must be employed. In particular, Dempsey '222 discloses the interface of a programmable processor (the Hewlett Packard 100LX palmtop processor) with a physiological monitor. The device is not able to adapt or change the physiological monitor, by software or otherwise, to accept different physiological signals.

[0007] The Fluke corporation manufactures a wireless data acquisition system under the trade name of "Wireless Logger". The "Wireless Logger" is an integration of Fluke's Hydra Data Logger, a portable instrument monitor/analyzer, which accepts wired external inputs, with an RF modem. The Hydra Data Logger includes a universal input module which accepts and conditions external inputs. The resulting signals are transmitted by the modem to another modem interconnected to a personal computer. The separate modem and universal input module are relatively large and consume up to ten watts of power. The operation of the system is not software programmable. RF Neulink markets a similar system utilizing the VHF (136-280 MHz) and UHF (403-512 MHz) bands.

[0008] U.S. Patent No. 6,167,258, entitled PROGRAMMABLE WIRELESS DATA ACQUISITION SYSTEM, issued to Schmidt et al, discloses the use of a signal processing module which is capable of accepting multiple external inputs having different characteristics and rang-

es. The '258 Schmidt et al. device, through programming, converts and conditions the external inputs, generates an RF signal encoded with data corresponding to the external inputs and transmits the signal to a base station.

[0009] U.S. Patent No. 6,230,049, entitled INTEGRATED SYSTEM FOR EEG MONITORING AND ELECTRICAL STIMULATION WITH A MULTIPLICITY OF ELECTRODES, issued to Fischell et al., discloses an integrated EEG monitoring and electrical stimulation system that has a wireless link between a patient electronics module and an EEG analysis workstation.

[0010] Reference is also made to US 5,579,001, US 5,564,429, US 6,544,173 and US 6,544,174.

[0011] In general, the prior art attempts at monitoring and transferring patient data are illustrated in Figures 1 and 3. In none of these cases is the same patient connected device used to transfer data to either a patient monitor processor or a central station with the same underlying wireless technology. Accordingly, a need remains for a system based on the same underlying technology that allows patient monitoring data collected by multiple monitors connected to a patient to be wirelessly transferred to another device such as a Patient Monitoring Processor for the purpose of displaying, synchronizing and processing the data.

Summary of the Invention

[0012] The invention is defined in the independent claims, to which reference should now be made. Advantageous embodiments are set out in the sub claims.

[0013] Embodiments of the present invention provide a system that allows patient monitoring data collected by one or more sensors or devices connected to a patient to be wirelessly transferred to another device, such as a patient monitoring processor. The transferred data may be displayed, synchronized and otherwise processed. The patient monitoring processor may be located in close proximity to the patient or at some distance depending on the mode of operation of the patient monitoring system. The wireless data transfer operates in both directions, that is, data can also be transferred from the patient monitor processor to the patient connected devices. The same patient connected device is used to transfer and receive data to or from either a patient monitor processor, a central station or both depending on the state of the patient without any alteration of the patient connected device hardware.

Brief Description of the Drawings

[0014]

Figure 1 is a schematic diagram of a prior art system for monitoring a patient;

Figure 2 is a schematic diagram of a patient monitoring system constructed according to the principles of the present invention;

Figure 3 is a schematic diagram of a prior art patient monitoring telemetry system;

Figure 4 is a schematic diagram of wireless patient monitoring system constructed according to the principles of the present invention;

Figure 5 is a schematic diagram of an antenna arrangement used in the system depicted in Figure 2; and

Figure 6 a schematic diagram of a patient monitoring processor subsystem as utilized in the system depicted in Figure 2.

Detailed Description of the Invention

[0015] Referring to Figure 2, a two way wireless patient monitoring system is shown generally at 1. The patient 2 is attached to a plurality of patient connected devices 3 and 4. Patient connected device 3, for example, contains an EEG sensor 5, carbon dioxide monitor 6 and an ECG sensor 7. Each sensor 5, 6 and 7 is interconnected to a common device 3 which contains suitable data gathering electronics as well as an RF transceiver interconnected to antenna 8. Also contained within the common device 3 is microprocessor which enables the device 3 to function as a slave station in a piconet. Patient connected device 4 operates in a manner similar to patient connected device 3.

[0016] A patient monitoring processor 9 includes a microprocessor and RF transceiver which is interconnected to antenna 10. Signals 11 are transferred between the patient connected device 3 and the patient monitoring processor 9 which can act as either a master or slave station within a wireless cell without any change of the patient monitoring processor hardware. The wireless data is transferred using any suitable protocol of which the Bluetooth standard is an example. Bluetooth technology provides a universal radio interface in the 2.45 GHz frequency band that enables portable electronic devices to connect and communicate wirelessly via short range ad hoc networks.

[0017] Bluetooth technology is described for example in Haartsen, "Bluetooth, The Universal Radio Interface for Ad Hoc, Wireless Connectivity", Ericsson Review No. 3, 1998, pp. 110-117. A wireless cell or "piconet" composed of the patient monitoring processor 9 acting in this case as the master station and the patient connected devices 3 and 4 acting as slave stations permits the transfer of physiological data from any of the patient connected devices 3 and 4 to the patient monitoring processor 9 for the purpose of displaying data, interpreting data and synchronizing the operation of the several patient connected devices. This architecture creates a personal area network 12.

[0018] Referring also to Figure 4, the same patient connected devices 3 and 4 (device 4 not shown) are also able to transfer data to a device other than the patient monitor processor 9. In particular, there will be instances where the patient 2 is being transferred from one area to another or perhaps is well enough to be able to walk around the area on her own. In those instances there would still be a desire to monitor the patient from a distance. The patient connected device 3 can transmit the data signal 11 to the patient monitor 9, but can also simultaneously or serially (consecutively) transmit the data signal 11 to an auxiliary processor 13, depending on the location of the patient 2. The auxiliary processor 13 is interconnected to a central station 14 by a conventional network 15.

[0019] Referring also to Figure 5, the power of the wireless transceiver housed within the patient connected device 3 can be adjusted to minimize interference with other piconets in the area, and to minimize the number of receiving stations when transferring telemetry. Existing Bluetooth specifications are designed to reduce transmission power when the two communicating devices are in close proximity. The benefit of reduced power consumption is to extend battery life of the patient connected device 3 and to reduce the likelihood of interference with other nearby wireless devices. Ideally the antennae of both communicating devices should be as close together as possible. The Bluetooth master antenna 10 which is connected to the patient monitor processor 9 is located at the end of an extension cable 16 in order to reduce the distance to the antenna 8 of patient connected device 3.

[0020] The present system 12 separates the physiological signal acquisition (obtained via patient connected devices 3 and 4) from the backend processing and display of the signals accomplished by the patient monitor processor 9. Referring also to Figure 6, the patient monitor processor is a standard workstation or web browser device. The patient monitor processor 9 is connected to a local area network 17 and performs functions not only as the local display for patient monitoring but also retrieves other useful information for the physician who may reside elsewhere. Such information for example is contained in a central database server 18 on the local area network 17, or the information may be contained in other places 19, 20 in the overall hospital network 21. Information may also be obtained from the internet 22. The patient monitor processor 9 my be used as a local display and also as a window into other medical and nonmedical information accessible through the network connection 23.

Claims

1. A patient area network, comprising:

(a) at least one patient connected device (3, 4), comprising

a sensor (5, 6, 7) adapted to detect and store at least one physiological parameter from a patient; and
a radio frequency transceiver (8) adapted to communicate with a patient monitor processor; and

(b) a patient monitor processor (9) adapted to receive wireless physiological data from the patient connected device and to transmit wireless instructions to the patient connected device, the patient monitor processor being configured to act as one of (i) a master station within a cell and (ii) a slave station within a cell;

wherein the patient monitor processor is configured to: display physiological data received from each patient connected device; interpret physiological data received from each patient connected device; and synchronize operation of each patient connected device with every other patient connected device.

2. The patient area network of claim 1 further comprising a central station adapted to send and receive data from each patient connected device.

3. The patient area network of claim 2 wherein the central station further comprises: a radio frequency transceiver configured to communicate with each patient connected device.

4. The patient area network of claim 3 further comprising a wireless data transfer protocol to reduce transmission power in response to close proximity of a patient connected to any data receiving device within the cell.

5. The patient area network of claim 4 further comprising:

a master antenna; and
an extension cable interconnecting the master antenna and the patient monitor processor configured to decrease separation between the patient connected device and the patient monitor processor.

6. The patient area network of claim 5 wherein the patient monitor processor comprises a web browser.

7. The patient area network of claim 6 wherein the patient monitor processor is interconnected to a local area network.

8. The patient area network of claim 7 wherein the local area network comprises an internet connection.

9. A method of monitoring physiological signals from a patient, comprising the steps of:

using at least one physiological parameter sensor (5, 6, 7) attached to a patient;
interconnecting the physiological parameter sensor to a first wireless transceiver of a patient connected device (3, 4),
conditioning a physiological data signal for at least one of, (a) an ambulatory patient mode and (b) a non-ambulatory patient mode;
designating a patient monitor processor (9) as one of (i) a master station in a wireless cell and (ii) a slave station in a wireless cell; and
transmitting said physiological data signal from the fist wireless transceiver to a patient monitor processor, the patient monitor processor being adapted to receive wireless physiological data from the patient connected device and to wirelessly transmit commands to the patient connected device.

10. The method of claim 9, further comprising the steps of:

interconnecting the patient monitor processor to a second wireless transceiver and enabling transmitting informational data from the second wireless transceiver to the first wireless transceiver; and
wherein the patient monitor processor performs the steps of displaying physiological data received from each patient connected device;
interpreting physiological data received from each patient connected device; and
synchronizing operation of each patient connected device with other patient connected devices.

11. The method of claim 10, further comprising the steps of:

interconnecting an auxiliary processor to a central station;
transmitting data from the first wireless transceiver to the auxiliary processor; and
transmitting data from the auxiliary processor to the first wireless receiver.

12. The method of claim 11 further comprising the step of communicating between the first wireless transceiver and the auxiliary processor by means of a wireless protocol that reduces transmission power as path length between the first wireless transceiver and the auxiliary processor decreases.

13. The method of claim 11, further comprising the step of interconnecting an antenna to the second wireless transceiver by means of an extension cable so as to decrease the path length between the antenna and the first wireless transceiver.

14. The method of claim 12, further comprising the step of configuring the patient monitor processor as a web browser.

15. The method of claim 13 further comprising the step of interconnecting the patient monitor processor to a local area network.

16. The method of claim 14 further comprising the step of linking the local area network to an internet connection.

17. The method of claim 9 further comprising the step of adaptively selecting between said ambulatory patient mode and said non-ambulatory patient mode in response to user command.

18. The method of claim 9 wherein said transmitting step uses a single transmitter for both said ambulatory patient mode and said non-ambulatory patient mode.

19. The method of claim 9 further comprising the steps of

using a plurality of physiological parameter sensors of different type attached to a patient;
interconnecting said physiological parameter sensors to at least one wireless transceiver;
conditioning physiological data signals containing different types of physiological data for at least one of, (a) an ambulatory patient mode and (b) a non-ambulatory patient mode; and
transmitting said physiological data signals from said at least one wireless transceiver to a patient monitor.

20. The method of claim 19 including the step of

using a map for dynamically allocating said physiological data signals to corresponding ports on said at least one transceiver.

21. The method of claim 19 wherein

said different types of physiological data include at least two of, (a) EKG data, (b) ECG data, (c) EEG data, (d) blood pressure data, (e) respiratory data, (f) blood parameter data, (g) pulse rate data and (h) muscle activity associated data.

Patentansprüche

1. Patientenbereichsnetz, umfassend:

a) mindestens eine mit dem Patienten verbundene Vorrichtung (3, 4), umfassend

einen Sensor (5, 6, 7), der dafür ausgelegt ist, zumindest einen physiologischen Parameter von einem Patienten zu erfassen und zu speichern; und
einen Hochfrequenz-Transceiver (8), der dafür eingerichtet ist, mit einem Patientenüberwachungsprozessor zu kommunizieren; und

b) einen Patientenüberwachungsprozessor (9), der dafür ausgelegt ist, drahtlos physiologische Daten von der mit dem Patienten verbundenen Vorrichtung zu empfangen und drahtlos Befehle an die mit dem Patienten verbundene Vorrichtung zu übertragen, wobei der Patientenüberwachungsprozessor so konfiguriert ist, dass er entweder i) als eine Master-Station innerhalb einer Zelle oder ii) als Slave-Station innerhalb einer Zelle wirkt,

und der Patientenüberwachungsprozessor konfiguriert ist für: das Anzeigen physiologischer Daten, die von jeder mit einem Patienten verbundenen Vorrichtung empfangen werden; das Interpretieren physiologischer Daten, die von jeder mit einem Patienten verbundenen Vorrichtung empfangen werden; und das Synchronisieren der Arbeit einer jeden mit einem Patienten verbundenen Vorrichtung mit jeder anderen mit einem Patienten verbundenen Vorrichtung.

2. Patientenbereichsnetz nach Anspruch 1, zudem umfassend eine zentrale Station, die dafür eingerichtet ist, Daten von jeder mit einem Patienten verbundenen Vorrichtung zu empfangen bzw. dorthin zu senden.

3. Patientenbereichsnetz nach Anspruch 2, worin die zentrale Station zudem enthält:

einen Hochfrequenz-Transceiver, der dafür konfiguriert ist, mit jeder mit einem Patienten verbundenen Vorrichtung zu kommunizieren.

4. Patientenbereichsnetz nach Anspruch 3, zudem umfassend ein Protokoll für drahtlose Datenübertragung, damit die Übertragungsleistung abhängig von einer großen Nähe eines Patienten verringert wird, der mit irgendeiner beliebigen Datenempfangsvorrichtung innerhalb der Zelle verbunden ist.

5. Patientenbereichsnetz nach Anspruch 4, zudem umfassend:

eine Master-Antenne; und
ein Verlängerungskabel, das die Master-Antenne und den Patientenüberwachungsprozessor verbindet und dafür konfiguriert ist, den Abstand zwischen der mit einem Patienten verbundenen Vorrichtung und dem Patientenüberwachungsprozessor zu verringern.

6. Patientenbereichsnetz nach Anspruch 5, worin der Patientenüberwachungsprozessor einen Web-Browser umfasst.

7. Patientenbereichsnetz nach Anspruch 6, worin der Patientenüberwachungsprozessor mit einem lokalen Netz verbunden ist.

8. Patientenbereichsnetz nach Anspruch 7, worin das lokale Netz über einen Internetanschluss verfügt.

9. Verfahren zum Überwachen physiologischer Signale von einem Patienten, umfassend die Schritte:

den Gebrauch mindestens eines Sensors (5, 6, 7) für physiologische Parameter, der an einem Patienten angebracht ist;
das Verbinden des Sensors für physiologische Parameter mit einem ersten drahtlosen Transceiver einer mit einem Patienten verbundenen Vorrichtung (3, 4);
das Aufbereiten eines physiologischen Datensignals zumindest entweder für a) einen Modus für einen beweglichen Patienten und b) einen Modus für einen nicht beweglichen Patienten;
das Bezeichnen eines Patientenüberwachungsprozessors (9) entweder als i) Master-Station in einer drahtlosen Zelle oder ii) Slave-Station in einer drahtlosen Zelle; und
das Übertragen des physiologischen Datensignals von dem ersten drahtlosen Transceiver zu einem Patientenüberwachungsprozessor, wobei der Patientenüberwachungsprozessor dafür eingerichtet ist, drahtlos physiologische Daten von der mit einem Patienten verbundenen Vorrichtung zu empfangen und drahtlos Befehle an die mit einem Patienten verbundene Vorrichtung zu übertragen.

10. Verfahren nach Anspruch 9, zudem umfassend die Schritte:

das Verbinden des Patientenüberwachungsprozessors mit einem zweiten drahtlosen Transceiver und die Freigabe des Sendens von Informationsdaten von dem zweiten drahtlosen Transceiver an den ersten drahtlosen Transceiver,
wobei der Patientenüberwachungsprozessor Schritte ausführt, in denen von jeder mit einem Patienten verbundenen Vorrichtung empfangene physiologische Daten angezeigt werden;

das Interpretieren physiologischer Daten, die von jeder mit einem Patienten verbundenen Vorrichtung empfangen werden; und
das Synchronisieren der Arbeit einer jeden mit einem Patienten verbundenen Vorrichtung mit anderen mit einem Patienten verbundenen Vorrichtungen.

11. Verfahren nach Anspruch 10, zudem umfassend die Schritte:

das Verbinden eines Hilfsprozessors mit einer zentralen Station;
das Übertragen von Daten von dem ersten drahtlosen Transceiver zu dem Hilfsprozessor; und
das Übertragen von Daten von dem Hilfsprozessor zu dem ersten drahtlosen Transceiver.

12. Verfahren nach Anspruch 11, zudem umfassend den Schritt des Kommunizierens zwischen dem ersten drahtlosen Transceiver und dem Hilfsprozessor mit Hilfe eines drahtlosen Protokolls, das die Übertragungsleistung verringert, wenn die Weglänge zwischen dem ersten drahtlosen Transceiver und dem Hilfsprozessor abnimmt.

13. Verfahren nach Anspruch 11, zudem umfassend den Schritt des Anschließens einer Antenne an den zweiten drahtlosen Transceiver mit Hilfe eines Verlängerungskabels, damit die Weglänge zwischen der Antenne und dem ersten drahtlosen Transceiver abnimmt.

14. Verfahren nach Anspruch 12, ferner umfassend den Schritt des Konfigurierens des Patientenüberwachungsprozessors als Web-Browser.

15. Verfahren nach Anspruch 13, weiterhin umfassend den Schritt des Anschließens des Patientenüberwachungsprozessors an ein lokales Netz.

16. Verfahren nach Anspruch 14, auch umfassend den Schritt des Anbindens des lokalen Netzes an einen Internetanschluss.

17. Verfahren nach Anspruch 9, zudem umfassend den Schritt, in dem abhängig von einem Benutzerbefehl adaptiv zwischen dem Modus für einen beweglichen Patienten und dem Modus für einen nicht beweglichen Patienten gewählt wird.

18. Verfahren nach Anspruch 9, worin in dem Übertragungsschritt ein einzelner Sender sowohl für den Modus für einen beweglichen Patienten als auch für den Modus für einen nicht beweglichen Patienten verwendet wird.

19. Verfahren nach Anspruch 9, ferner umfassend die Schritte:

das Verwenden einer Anzahl Sensoren für physiologische Parameter von unterschiedlichem Typ, die an einem Patienten angebracht sind;
das Verbinden der Sensoren für physiologische Parameter mit mindestens einem drahtlosen Transceiver;
das Aufbereiten physiologischer Datensignale, die unterschiedliche Arten von physiologischen Daten enthalten, zumindest für a) einen Modus für einen beweglichen Patienten und b) einen Modus für einen nicht beweglichen Patienten; und
das Übertragen der physiologischen Datensignale von dem mindestens einen drahtlosen Transceiver an einer Patientenüberwachung.

20. Verfahren nach Anspruch 19, umfassend den Schritt des Verwendens eines Zuordnungsplans zum dynamischen Zuweisen der physiologischen Datensignale an entsprechende Ports auf dem mindestens einen Transceiver.

21. Verfahren nach Anspruch 19, wobei die unterschiedlichen Arten von physiologischen Daten zumindest zwei Daten aus a) EKG-Daten, b) ECG-Daten, c) EEG-Daten, d) Blutdruckdaten, e) Atmungsdaten, f) Blutparameterdaten, g) Pulszahldaten und h) der Muskelaktivität zugeordneten Daten umfassen.

Revendications

1. Réseau de zone de patients, comprenant:

(a) au moins un dispositif (3, 4) relié au patient, comprenant

un capteur (5, 6, 7) apte à détecter et à stocker au moins un paramètre physiologique d'un patient; et
un émetteur-récepteur de fréquence radio (8) apte à communiquer avec un processeur de surveillance des patients; et

(b) un processeur de surveillance des patients (9) apte à recevoir sans fil des données physiologiques du dispositif relié au patient et à transmettre des instructions sans fil au dispositif relié au patient, le processeur de surveillance des patients étant configuré pour agir comme une parmi (i) une station maître dans une cellule et (ii) une station esclave dans une cellule;

où le processeur de surveillance des patients est configuré pour:

afficher des données physiologiques reçues de chaque dispositif relié au patient;
interpréter des données physiologiques reçues de chaque dispositif relié au patient; et
synchroniser l'opération de chaque dispositif relié au patient avec chaque autre dispositif relié au patient.

2. Réseau de zone de patients selon la revendication 1, comprenant en outre une station centrale apte à émettre et à recevoir des données de chaque dispositif relié au patient.

3. Réseau de zone de patients selon la revendication 2, dans lequel la station centrale comprend en outre: un émetteur-récepteur radiofréquence configuré pour communiquer avec chaque dispositif relié au patient.

4. Réseau de zone de patients selon la revendication 3, comprenant en outre un protocole de transfert de données sans fil pour réduire la puissance de transmission en réponse à la proximité étroite d'un patient relié à n'importe quel dispositif de réception de données dans la cellule.

5. Réseau de zone de patients selon la revendication 4, comprenant en outre:

une antenne maître; et
un câble d'extension interconnectant l'antenne maître et le processeur de surveillance de patients configuré pour réduire la séparation entre le dispositif relié au patient et le processeur de surveillance des patients.

6. Réseau de zone de patients selon la revendication 5, dans lequel le processeur de surveillance de patients comprend un navigateur web.

7. Réseau de zone de patients selon la revendication 6, dans lequel le processeur de surveillance des patients est interconnecté à un réseau de zone locale.

8. Réseau de zone de patients selon la revendication 7, dans lequel le réseau de zone locale comprend une connection internet.

9. Procédé de surveillance de signaux physiologiques d'un patient, comprenant les étapes de:

utiliser au moins un capteur (5, 6, 7) de paramètres physiologiques attachés à un patient;
interconnecter le capteur des paramètres physiologiques avec un premier émetteur-récepteur sans fil d'un dispositif relié au patient (3, 4);
conditionner un signal de données physiologiques pour au moins un parmi (a) un mode ambulatoire pour patient et (b) un mode non ambulatoire pour patient;
désigner un processeur de surveillance de patients (9) comme l'une parmi (i) une station maître dans une cellule sans fil et (ii) une station esclave dans une cellule sans fil; et
transmettre ledit signal de données physiologiques du premier émetteur-récepteur sans fil à un processeur de surveillance de patients, le processeur de surveillance de patients étant apte à recevoir des données physiologiques sans fil du dispositif relié au patient et à transmettre sans fil des instructions au dispositif relié au patient.

10. Procédé selon la revendication 9, comprenant en outre les étapes de: interconnecter le processeur de surveillance de patient à un deuxième émetteur-récepteur sans fil et permettre la transmission de données d'information du deuxième émetteur-récepteur sans fil au premier émetteur-récepteur sans fil; et

où le processeur de surveillance de patient exécute les étapes consistant à afficher les données physiologiques reçues de chaque dispositif relié au patient;
interpréter les données physiologiques reçues de chaque dispositif relié au patient; et
synchroniser l'opération de chaque dispositif relié au patient avec d'autres dispositifs reliés au patient.

11. Procédé selon la revendication 10, comprenant en outre les étapes de:

interconnecter un processeur auxiliaire à une station centrale;
transmettre des données du premier émetteur-récepteur sans fil au processeur auxiliaire; et
transmettre des données du processeur auxiliaire au premier récepteur sans fil.

12. Procédé selon la revendication 11, comprenant en outre l'étape consistant à communiquer entre le premier émetteur-récepteur sans fil et le processeur auxiliaire au moyen d'un protocole sans fil qui réduit la puissance de transmission au fur et à mesure que la longueur de chemin entre le premier émetteur-récepteur sans fil et le processeur auxiliaire diminue.

13. Procédé selon la revendication 11, comprenant en outre l'étape consistant à interconnecter une antenne au deuxième émetteur-récepteur sans fil au moyen d'un câble d'extension de manière à diminuer la longueur du chemin entre l'antenne et le premier émetteur-récepteur sans fil.

14. Procédé selon la revendication 12, comprenant en

outre l'étape consistant à configurer le processeur de surveillance des patients comme un navigateur web.

15. Procédé selon la revendication 13, comprenant en outre l'étape consistant à interconnecter le processeur de surveillance du patient à un réseau de zone locale.

16. Procédé selon la revendication 14, comprenant en outre l'étape consistant à relier le réseau de zone locale à une connection internet.

17. Procédé selon la revendication 9, comprenant en outre l'étape consistant à sélectionner de manière adaptative ledit mode ambulatoire pour patient et ledit mode non-ambulatoire pour patient en réponse à une instruction de l'utilisateur.

18. Procédé selon la revendication 9, dans lequel ladite étape de transmission utilise un seul émetteur-récepteur à la fois pour ledit mode ambulatoire pour patient et ledit mode non ambulatoire pour patient.

19. Procédé selon la revendication 9, comprenant en outre les étapes de:

utiliser une pluralité de capteurs de paramètres physiologiques de types différents attachés à un patient;
interconnecter lesdits capteurs des paramètres physiologiques à au moins un émetteur-récepteur sans fil;
conditionner des signaux de données physiologiques contenant différents types de données physiologiques pour au moins un parmi (a) un mode ambulatoire pour patient et (b) un mode non ambulatoire pour patient; et
transmettre lesdits signaux de données physiologiques dudit au moins un émetteur-récepteur sans fil à un moniteur de patient.

20. Procédé selon la revendication 19, comprenant l'étape consistant à utiliser une carte pour attribuer d'une manière dynamique lesdits signaux de données physiologiques à des accès correspondants sur ledit au moins un émetteur-récepteur.

21. Procédé selon la revendication 19, dans lequel lesdits types différents de données physiologiques comprennent au moins deux de (a) des données EKG, (b) des données ECG, (c) des données EEG, (d) des données de pression sanguine, (e) des données respiratoires, (f) des données de paramètre du sang, (g) des données de fréquence du pouls et (h) des données associées à l'activité musculaire.

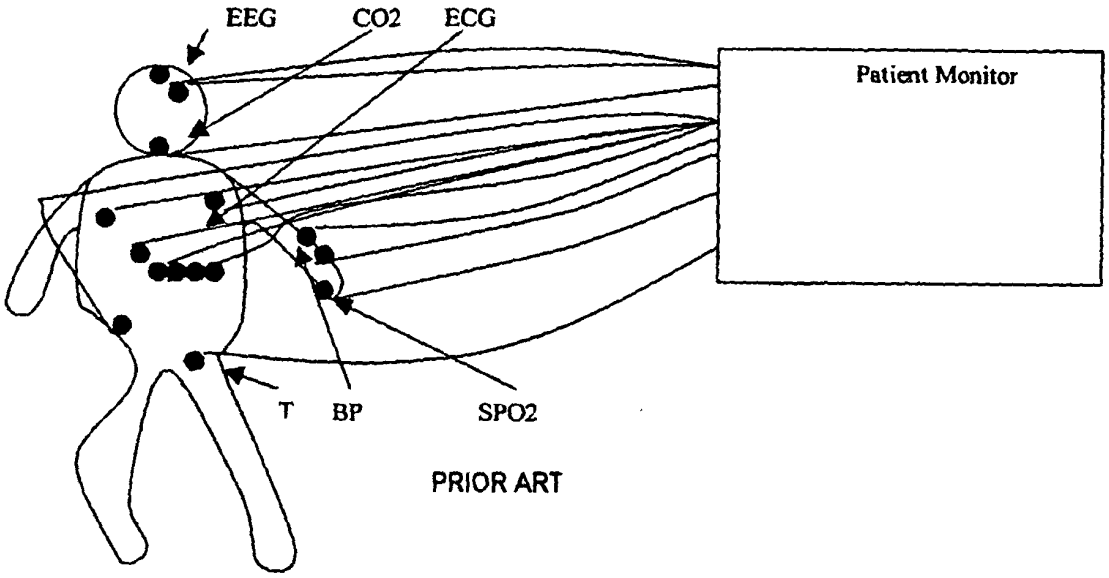


Figure 1

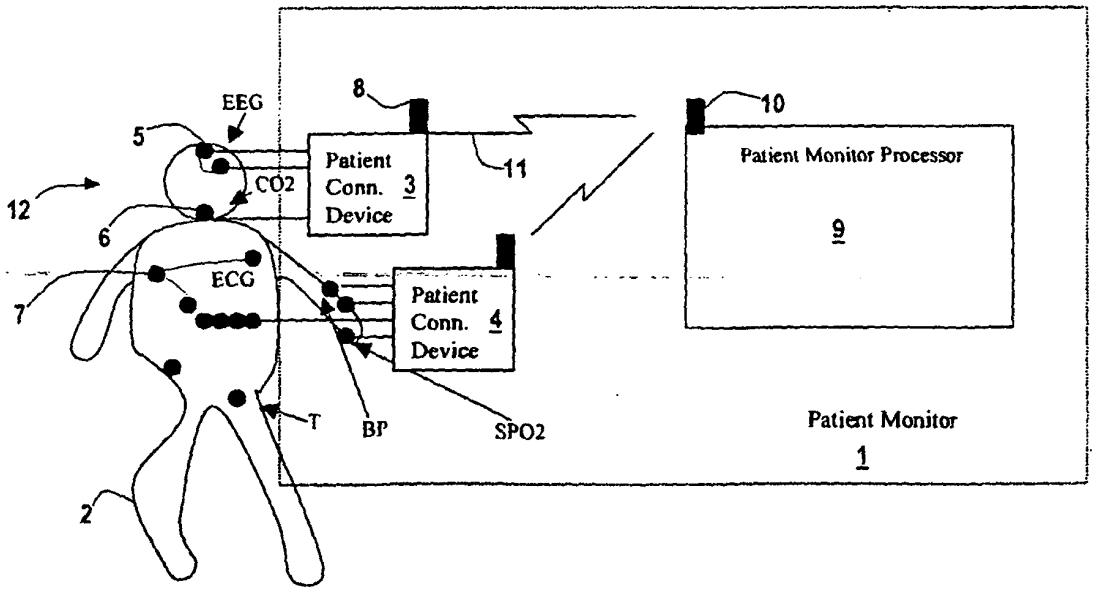
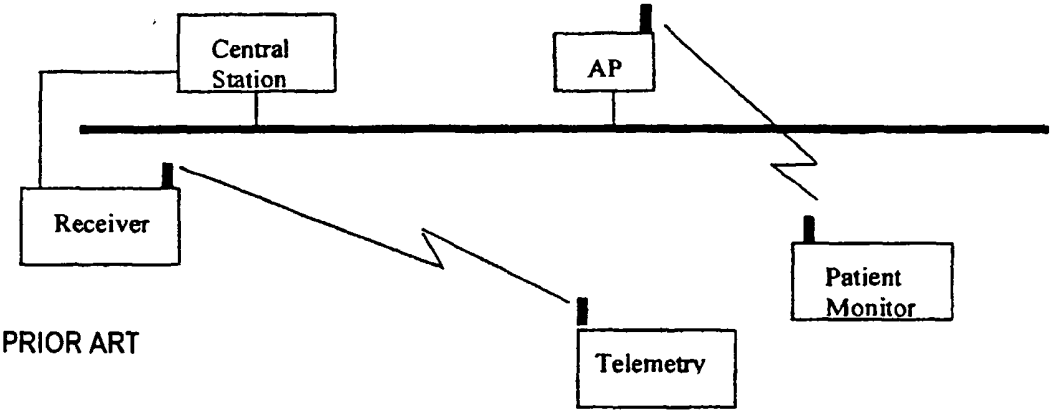


Figure 2



PRIOR ART

Figure 3

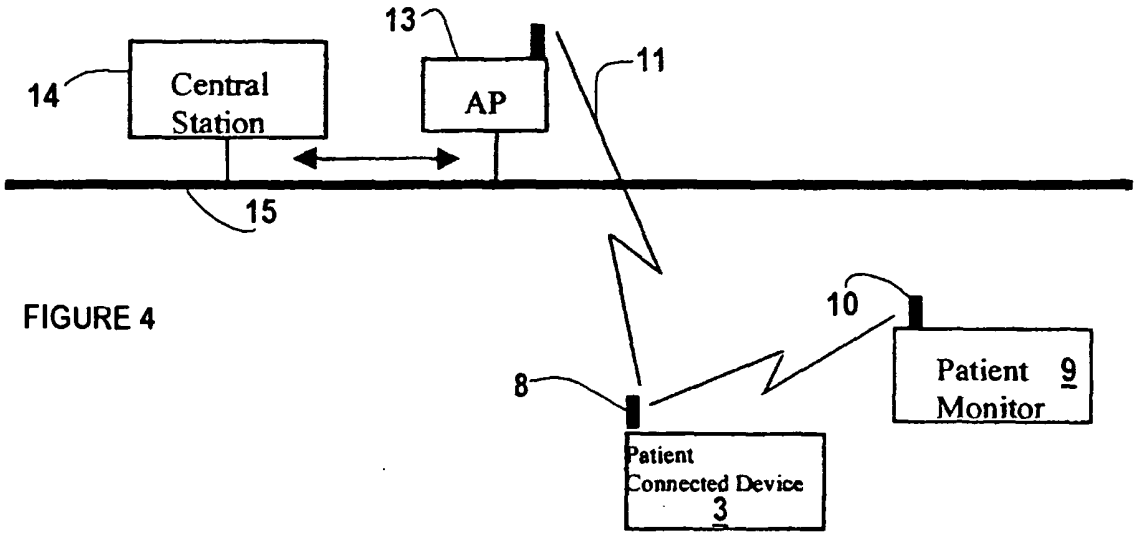


FIGURE 4

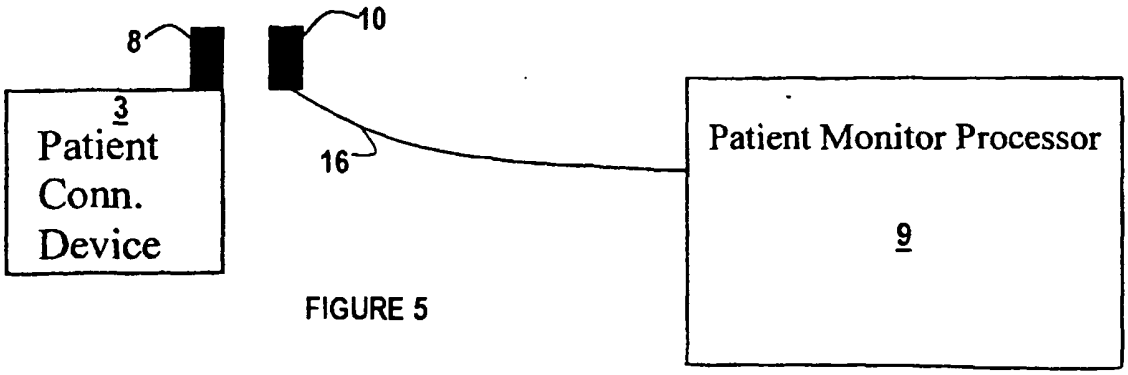


FIGURE 5

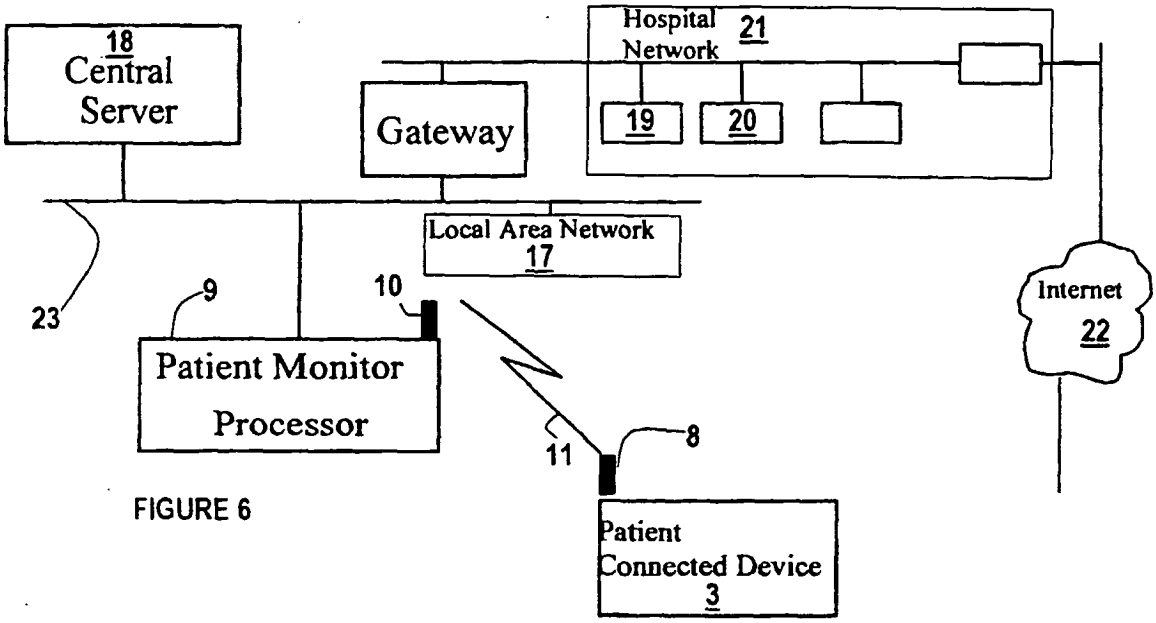

18
Central
Server
Gateway
Hospital
Network
21
19
20
Local Area Network
17
23
9
10
Patient Monitor
Processor
11
8
Internet
22
Patient
Connected Device
3

FIGURE 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5704351 A, Mortara **[0003]**
- US 5755230 A, Schmidt **[0004]**
- US 5579775 A **[0005]**
- US 5417222 A, Dempsey **[0006]**
- US 6167258 A **[0008]**
- US 6230049 B **[0009]**
- US 5579001 A **[0010]**
- US 5564429 A **[0010]**
- US 6544173 B **[0010]**
- US 6544174 B **[0010]**

Non-patent literature cited in the description

- **HAARTSEN.** Bluetooth, The Universal Radio Interface for Ad Hoc, Wireless Connectivity. *Ericsson Review,* 1998, vol. 3, 110-117 **[0017]**

专利名称(译)	患者监测区域网络		
公开(公告)号	EP1359842B1	公开(公告)日	2009-05-06
申请号	EP2002718968	申请日	2002-02-13
申请(专利权)人(译)	西门子医疗系统公司.		
当前申请(专利权)人(译)	德尔格医疗系统公司.		
[标]发明人	RUSS TOMAS		
发明人	RUSS, TOMAS		
IPC分类号	A61B5/00 A61B5/0476		
CPC分类号	A61B5/0006 A61B5/0024 A61B5/145 Y10S128/903 Y10S128/904		
优先权	60/268770 2001-02-14 US		
其他公开文献	EP1359842A2		
外部链接	Espacenet		

摘要(译)

允许患者监测由患者连接的设备获得的数据的系统通过无线信号传输到诸如患者监测处理器的另一设备。根据患者的位置，使用相同的患者连接设备将数据传输到患者监视器处理器或中心站。单个设备用于个人区域网络和遥测/传输应用。在这两种情况下都使用相同的无线技术，无需部署多个天线/接收器系统。使用诸如蓝牙的现有无线传输协议，从而当两个通信设备非常接近时降低传输功率。

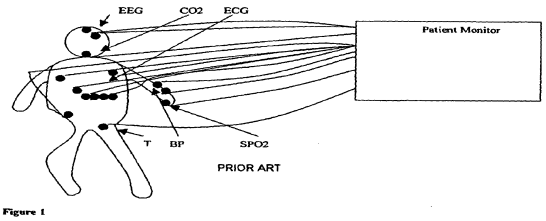

Figure 1

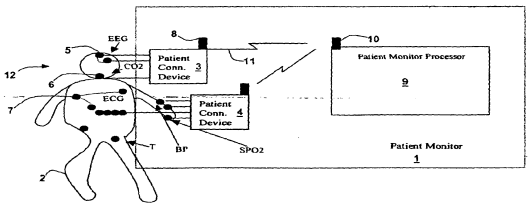

Figure 2