

We claim:

1. A system for enabling the remote monitoring of a plurality of medical devices, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit data packets containing information provided by the medical devices, wherein each said data packet includes data identifying at least a medical device ID, a patient ID and medical device data;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database, and

a web server configured for providing web pages for receiving at least the medical data and, subject to verification of the patient ID and medical device ID, transmitting the medical device data to a remote monitoring computer via a secure internet connection for displaying the medical device data by the remote monitoring computer.

2. The system of claim 1 wherein said device integration component is configured to reply to said wireless relay when said packet type for a received data packet matches a predetermined packet type.

3. The system of claim 1 wherein said web server is further configured to perform said verification.

4. The system of claim 1 wherein said data manager system is further configured to perform said verification.

5. The system of claim 1 wherein said verification is performed by a remote system.

6. The system of claim 1 further comprising a database of addresses of at least one remotely located secure patient database, said remote secure patient database maintaining a patient and medical device IDs.

7. The system of claim 6 wherein said database of addresses further comprises location information associated with the respective medical device IDs, wherein said web server is configured to retrieve a destination address from said address database according to said location information, retrieve patient data and medical device ID data from said remotely located patient database via said secure communications link according to said destination address, and retrieve said medical device data from said device control database according to said registered location data and said medical device ID data, said retrieved medical device data being transmitted to said web server.

8. The system of claim 1 wherein said data manager system further comprises a secure device server.

9. A system for enabling the monitoring of a plurality of medical devices, the system comprising:

a device integrator server in communication with at least one wireless relay device [via a mobile communications network], wherein said wireless relay device is configured to transmit data packets containing information provided by the medical devices, and

said device integration component is configured to receive the transmitted packets, to extract a packet type, a medical device ID and medical device data from each received packet, to identify a registered location associated with the extracted medical device ID, and to store the extracted medical device data with the extracted medical device ID and registered location in a device control database;

a web server configured for hosting web pages for display on a user computer, said web server being coupled to a patient data management system via a secure communications link; and

a data management component coupled to said device integration component and said web server, said data management component comprising said device control database, an applications database and a secure device server, wherein

said device integration component is configured to reply to said wireless relay via said mobile communications network when said packet type for a received data packet matches a predetermined packet type, and

said web server is configured to retrieve a destination address from said application database according to said registered location data, to retrieve patient data and medical device ID data from said patient data management system via said secure communications link according to said destination address, to retrieve said medical device data from said device control database via said secure device server according to said registered location data and said medical device ID data, and to prepare a web page for displaying said retrieved medical device data and patient data at the user computer.

10. A method for processing a medical device alert in a medical device monitoring system, the method comprising the steps of:

remotely receiving a data packet from a wireless relay device in communication with a medical device;

retrieving from the data packet a packet type, a medical device ID and a registered location of the medical device;

determining if said packet type is indicative of an alert condition;

retrieving alert response information from a patient data management system via a secure communications link; and

transmitting said alert response information to said medical relay device.

11. The method of claim 10 further comprising the step of:

storing said data packet as a data entry in a device control database, said data entry identifying said alert condition.

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

retrieving said stored data entry by a web server;

identifying a computer in communication with said web server as a current monitor for said medical device; and

transmitting an alert by said web server for display on a web page of said computer indicating said alert condition.

13. The method of claim 10, wherein said alert response information comprises text message data for transmission by said medical relay device via a mobile communications network.

14. The method of claim 10, further comprising the step of:
transmitting a bandwidth priority instruction to said medical relay device instructing said medical relay device to grant a service priority for relaying information between said medical device and said medical device monitoring system while said alert condition persists.

15. A method for registering a medical device for a patient with a medical device monitoring system, the method comprising the steps of:
receiving credentials of a user of a set-up computer;
receiving medical device identification data and associated patient identification data for a patient to be monitored;
verifying said user is authorized to initialize a medical device associated with the medical device information;
if verification is achieved then,
 (a) storing said medical device identification data in a device control database of said device data management system;
 (b) identifying, based on at least said received medical device identification data or patient identification data, an address for a secure patient database having information regarding said patient; and
 (c) storing said identified address in said device data management system in association with said medical device identification data; and
forwarding said patient identification data and said address to a web server that will generate secure webpages of medical device monitor information for access by a user of a monitoring computer.

16. The method of claim 15 wherein the verifying step comprises determining whether said user is a member of a group authorized to initialize the medical device indicated in said medical device identification data.

17. A method for displaying medical device data by a medical device monitoring system, the method comprising the steps of:

receiving credentials from a user of a monitoring computer and a request from said user for medical device information for a patient to be monitored;

verifying said user is authorized to receive the medical device information; and
if verification is achieved, then

(a) identifying, based on at least said credentials and said request, an address for a secure patient database having information regarding said patient; ;

(b) retrieving patient data and associated medical device identification data by a web server from said patient data management system over a secure communications link;

(c) retrieving medical device data from a device control database for at least one medical device according to said retrieved medical device identification data; and

(d) transmitting said retrieved medical device data by said web server for display on said monitoring computer.

18. A method for controlling a medical device by a medical device monitoring system, the method comprising the steps of:

receiving credentials from a user of a monitoring computer and a request from said user to control a medical device;

verifying said user is authorized to control said medical device; and
if verification is achieved, then

logging said request in a device control database;

transmitting a control command based on said user request to a relay device, said relay device being configured to issue said control command to said medical device;

receiving an update message from said relay device in response to said control command;
and

logging said update message in said device control database.

19. The method of claim 18, further comprising the step if said verification is achieved of:

transmitting said update message by a web server for display on said monitoring computer.

20. The method of claim 19, further comprising the step if said verification is achieved of transmitting data by said web server to said monitoring computer to display an image of a control panel of said medical device.

21. The method of claim 20, wherein said web server displays said update message by updating said image of said control panel.

22. The method of claim 21, wherein said updating includes activating an animated feature of said image.

23. The method of claim 18, wherein said verification step further comprises the steps of: retrieving authorized use information for said medical device, and determining that verification is achieved when said user is authorized to control said medical device and said control command is directed to an authorized use according to said authorized use information.

24. The method of claim 23, wherein said authorized use information comprises at least one of clinician instructions or prescriptions relating to a patient associated with said medical device, or patient metrics for the patient associated with said medical device.

1. A system for enabling the remote monitoring of a plurality of medical devices, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit user-initiated control packets containing control commands for the medical devices, and data packets containing information provided by the medical devices, wherein each said data packet includes data identifying at least a medical device ID, a patient ID and medical device data;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database, and

a web server configured for providing web pages for receiving at least the medical data and, subject to verification of the patient ID and medical device ID, transmitting the medical device data to a remote monitoring computer via a secure internet connection for displaying the medical device data by the remote monitoring computer.

2. The system of claim 1 wherein said device integrator server is configured to reply to said wireless relay when said packet type for a received data packet matches a predetermined packet type.

3. The system of claim 1 wherein said web server is further configured to perform said verification.

4. The system of claim 1 wherein said data manager system is further configured to perform said verification.

5. The system of claim 1 wherein said verification is performed by a remote system.

6. The system of claim 1 further comprising a database of addresses of at least one remotely located secure patient database, said remote secure patient database maintaining a patient and medical device IDs.

7. The system of claim 6 wherein said database of addresses further comprises location information associated with the respective medical device IDs, wherein said web server is configured to retrieve a destination address from said address database according to said location information, retrieve patient data and medical device ID data from said remotely located patient database via said secure communications link according to said destination address, and retrieve said medical device data from said device control database according to said registered location data and said medical device ID data, said retrieved medical device data being transmitted to said web server.

8. The system of claim 1 wherein said data manager system further comprises a secure device server.

9. A system for enabling the monitoring of a plurality of medical devices, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit user-initiated control packets containing control commands for the medical devices, and data packets containing information provided by the medical devices, and

said device integrator server is configured to receive the transmitted packets, to extract a packet type, a medical device ID and medical device data from each received packet, to identify a registered location associated with the extracted medical device ID, and to store the extracted medical device data with the extracted medical device ID and registered location in a device control database;

a web server configured for hosting web pages for display on a user computer, said web server being coupled to a patient data management system via a secure communications link; and

a data management component coupled to said device integrator server and said web server, said data management component comprising said device control database, an applications database and a secure device server, wherein

said device integrator server is configured to reply to said wireless relay via said mobile communications network when said packet type for a received data packet matches a predetermined packet type, and

said web server is configured to retrieve a destination address from said application database according to said registered location data, to retrieve patient data and medical device ID data from said patient data management system via said secure communications link according to said destination address, to retrieve said medical device data from said device control database via said secure device server according to said registered location data and said medical device ID data, and to prepare a web page for displaying said retrieved medical device data and patient data at the user computer.

10. A method for processing a medical device alert in a medical device monitoring system, the method comprising the steps of:

remotely receiving a data packet from a wireless relay device in communication with a medical device, wherein the data packets include user-initiated control packets containing control commands for the medical device;

retrieving from the data packet a packet type, a medical device ID and a registered location of the medical device;

determining if said packet type is indicative of an alert condition;

retrieving alert response information from a patient data management system via a secure communications link; and

transmitting said alert response information to said medical relay device.

11. The method of claim 10 further comprising the step of:

storing said data packet as a data entry in a device control database, said data entry identifying said alert condition.

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

retrieving said stored data entry by a web server;

identifying a computer in communication with said web server as a current monitor for said medical device; and

transmitting an alert by said web server for display on a web page of said computer indicating said alert condition.

13. The method of claim 10, wherein said alert response information comprises text message data for transmission by said medical relay device via a mobile communications network.

14. The method of claim 10, further comprising the step of:
transmitting a bandwidth priority instruction to said medical relay device instructing said medical relay device to grant a service priority for relaying information between said medical device and said medical device monitoring system while said alert condition persists.

15. A method for registering a medical device for a patient with a medical device monitoring system, the method comprising the steps of:
receiving credentials of a user of a set-up computer;
receiving medical device identification data and associated patient identification data for a patient to be monitored;
verifying said user is authorized to initialize a medical device associated with the medical device information;
if verification is achieved then,
storing said medical device identification data in a device control database of said device data management system;
identifying, based on at least said received medical device identification data or patient identification data, an address for a secure patient database having information regarding said patient; and
storing said identified address in said device data management system in association with said medical device identification data;

forwarding said patient identification data and said address to a web server that will generate secure webpages of medical device monitor information for access by a user of a monitoring computer; and

transmitting a user-initiated control command based on said user request to a relay device, said relay device being configured to issue said user-initiated control command to said medical device.

16. The method of claim 15 wherein the verifying step comprises determining whether said user is a member of a group authorized to initialize the medical device indicated in said medical device identification data.

17. A method for displaying medical device data by a medical device monitoring system, the method comprising the steps of:

receiving credentials from a user of a monitoring computer and a request from said user for medical device information for a patient to be monitored;

verifying said user is authorized to receive the medical device information; and if verification is achieved, then

identifying, based on at least said credentials and said request, an address for a secure patient database having information regarding said patient;

transmitting a control command initiated by the user to a relay device, said relay device being configured to issue said user-initiated control command to said medical device;

retrieving patient data and associated medical device identification data by a web server from said patient data management system over a secure communications link;

retrieving medical device data from a device control database for at least one medical device according to said retrieved medical device identification data; and

transmitting said retrieved medical device data by said web server for display on said monitoring computer.

18. A method for controlling a medical device by a medical device monitoring system, the method comprising the steps of:

receiving credentials from a user of a monitoring computer and a request from said user to control a medical device;

verifying said user is authorized to control said medical device; and

if verification is achieved, then

logging said request in a device control database;

transmitting a user-initiated control command based on said user request to a relay device, said relay device being configured to issue said user-initiated control command to said medical device;

receiving an update message from said relay device in response to said control command; and

logging said update message in said device control database.

19. The method of claim 18, further comprising the step if said verification is achieved of:

transmitting said update message by a web server for display on said monitoring computer.

20. The method of claim 19, further comprising the step if said verification is achieved of transmitting data by said web server to said monitoring computer to display an image of a control panel of said medical device.

21. The method of claim 20, wherein said web server displays said update message by updating said image of said control panel.

22. The method of claim 21, wherein said updating includes activating an animated feature of said image.

23. The method of claim 18, wherein said verification step further comprises the steps of:

retrieving authorized use information for said medical device, and

determining that verification is achieved when said user is authorized to control said medical device and said control command is directed to an authorized use according to said authorized use information.

24. The method of claim 23, wherein said authorized use information comprises at least one of clinician instructions or prescriptions relating to a patient associated with said medical device, or patient metrics for the patient associated with said medical device

CLAIMS

1. A system for enabling the remote monitoring of a plurality of medical devices, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit control packets containing control commands for the medical devices, wherein the control packets comprise device control commands for remotely controlling the medical devices from a remote terminal, to receive a reply from at least one of the medical devices that confirms execution of the control command, and to transmit data packets containing information provided by the medical devices, wherein each said data packet includes data identifying at least a medical device ID, a patient ID and medical device data;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database, and

a web server configured for providing web pages for receiving at least the medical data and, subject to verification of the patient ID and medical device ID, transmitting the medical device data to a remote monitoring computer via a secure internet connection for displaying the medical device data by the remote monitoring computer.

2. The system of claim 1 wherein said device integrator server is configured to reply to said wireless relay when said packet type for a received data packet matches a predetermined packet type.

3. The system of claim 1 wherein said web server is further configured to perform said verification.

4. The system of claim 1 wherein said data manager system is further configured to perform said verification.

5. The system of claim 1 wherein said verification is performed by a remote system.

6. The system of claim 1 further comprising a database of addresses of at least one remotely located secure patient database, said remote secure patient database maintaining a patient and medical device IDs.

7. The system of claim 6 wherein said database of addresses further comprises location information associated with the respective medical device IDs, wherein said web server is configured to retrieve a destination address from said address database according to said location information, retrieve patient data and medical device ID data from said remotely located patient database via said secure communications link according to said destination address, and retrieve said medical device data from said device control database according to said registered location data and said medical device ID data, said retrieved medical device data being transmitted to said web server.

8. The system of claim 1 wherein said data manager system further comprises a secure device server.

9. A system for enabling the monitoring of a plurality of medical devices, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit control packets containing control commands for the medical devices, wherein the control packets comprise device control commands for remotely controlling the medical devices from a remote terminal, to receive a reply from at least one of the medical devices that confirms execution of the control command, and to transmit data packets containing information provided by the medical devices, and

said device integrator server is configured to receive the transmitted packets, to extract a packet type, a medical device ID and medical device data from each received packet, to identify a registered location associated with the extracted medical device ID, and to store the extracted medical device data with the extracted medical device ID and registered location in a device control database;

a web server configured for hosting web pages for display on a user computer, said web server being coupled to a patient data management system via a secure communications link; and

a data management component coupled to said device integration component and said web server, said data management component comprising said device control database, an applications database and a secure device server, wherein

said device integration component is configured to reply to said wireless relay via said mobile communications network when said packet type for a received data packet matches a predetermined packet type, and

said web server is configured to retrieve a destination address from said application database according to said registered location data, to retrieve patient data and medical device ID data from said patient data management system via said secure communications link according to said destination address, to retrieve said medical device data from said device control database via said secure device server according to said registered location data and said medical device ID data, and to prepare a web page for displaying said retrieved medical device data and patient data at the user computer.