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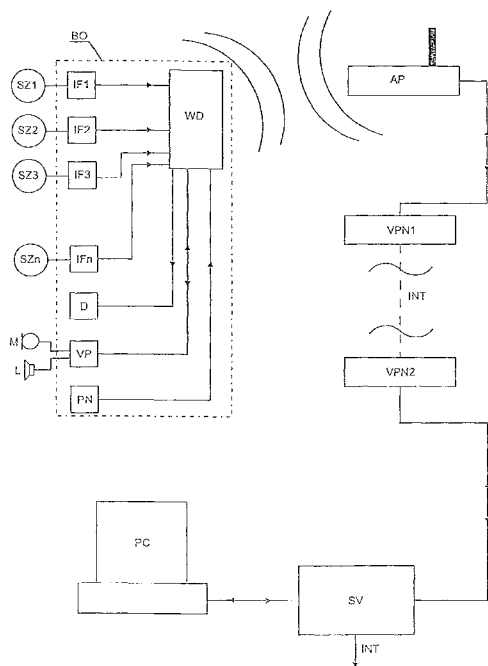


FIG. 1

(57) Abstract: The subject of the invention is wireless device and data transmitting and processing system connected to the wireless device, for monitoring and continuous controlling vital functions, with the help of which solution elderly people of bad state of health, respectively elderly people in need of constant monitoring, or constant monitoring of patients can be achieved without limiting their free motion, making possible the constant control of their vital functions, quick determination of the place of providing necessary help, in given case sending or receiving a distress signal. The wireless communication device (WD) according to the invention has sensors (SZ) joining via interfaces (IF) suitable for measuring vital functions of patients, and said wireless communication device (WD) joins wireless, through WiFi transmission any of the wireless access points (AP) of the system, furthermore the system has a central server (SE), which collects, records the data received from certain wireless communication devices (WD), it keeps a logbook on the patients and preferably a personal computer (PC) providing control, ensuring data and command input, acting as dispatcher, joins the server (SE). The solution is characterized by that, the characteristic vital functions reference data of the patient associated with the wireless communication device (WD) are set in the wireless communication device (WD), furthermore the data measured by the sensors (SZ) are continuously measured, stored and forwarded to the central server (SE) within certain periods of time, furthermore the wireless communication device (WD) continuously compares the data measured with the set reference data, and in case the values are above the limit values, on the one hand it sends local warning signal and/or alarm, on the other hand it forwards the warning signal and/or alarm to the central server (SE).

**WIRELESS DEVICE AND DATA TRANSMITTING AND PROCESSING  
SYSTEM CONNECTED TO THE WIRELESS DEVICE, FOR MONITORING  
AND CONTINUOUS CONTROLLING VITAL FUNCTIONS**

The subject of the invention is wireless device and data transmitting and processing system connected to the wireless device, for monitoring and continuous controlling vital functions, with the help of which solution elderly people of bad state of health, respectively elderly people in need of constant monitoring, or constant monitoring of patients can be achieved without limiting their free motion, making possible the constant control of their vital functions, quick determination of the place of providing necessary help, in given case sending or receiving a distress signal.

In health care, hospitals, clinics, or even in care homes, but also in several other walks of life it is a frequent problem, that monitoring of state of health of patients is necessary in order to provide help in time. There are a lot of people in health care and elderly care who's state of health need constant monitoring due to their injuries or illnesses, or the process of their recovery requires constant attention, however their condition does not require the use of intensive monitoring. It often means a problem in case of certain heart and circulatory diseases, that the patient suddenly feels ill, unable to call for help in time, which in given case can considerably decrease the chances of survival of the patient, or if they survive, major deterioration in their health condition can be expected.

In the state of the art the WO 2009/036150 patent application makes known patient data communication devices that may be used as wearable patient monitors. The devices are adapted to accept essentially any type of data from essentially any data source, and are reconfigurable, such that each device can determine which data inputs and outputs should be active, and can reconfigure itself based on new configuration instructions. The devices include wireless transceiver units that allow them to form networks, and particularly mesh networks, with other devices. In a mesh network, any one of the devices may serve as a data source, a data forwarder, or a data sink, and the processor of each device may determine whether data should be outputted, displayed, or processed on the local device or on a remote device in the network. Data from other devices in a mesh network may be accepted selectively, depending on the number of hops between the sending and receiving devices.

The device described above is suitable for establishing connection between the units and forwarding each other's reception. Certain devices can establish a connection with the centre in such a way, that one of the devices uses the other device as a relay, respectively wireless transmitters are used for this purpose. The drawback of the solution is, that there is no permanent formed data transmitting network, so in case of failure of certain parts of the data transmitting chain the connection with the centre can stop. In case of monitoring patients or elderly people this solution might result in uncertain supervision, respectively communication.

The WO 2009/058788 patent application makes known a remote wireless monitoring system for patient data, and an ambulatory system for processing and transmitting physiological characteristic data. An embodiment of a system for remote wireless monitoring of data for a patient includes an ambulatory sensor/transmitter subsystem that wirelessly transmits measured values of a physiological characteristic of the patient, a base station that wirelessly receives signals from the sensor/transmitter subsystem, and a remote monitor that wirelessly receives signals from the base station. The remote monitor is configured to generate audio and/or visual indicia (representing alarms, the measured values, device or system status information, etc.) in response to the base station signals. An embodiment of an ambulatory system includes a physiological characteristic sensor, a self-contained sensor processor module coupled to the ambulatory physiological characteristic sensor, and an ambulatory data receiver device coupled to the self-contained sensor processor module.

The drawback of the solution is, that it is not suitable for arranging distant selective alarm, that is when perceiving certain health condition values, the certain value ranges can not be adjusted, respectively modified for the patient from a distance.

The CA 2482 859 patent application makes known a patient monitoring system which provides enhanced functional capability relative to known systems and provides a wireless communication link between a patient monitoring device, worn by a patient, and a local hub. The patient monitoring system is adapted to monitor various patient physiological characteristics, such as blood pressure, pulse rate, blood glucose, weight, pulse oximetry and others. The data from the patient monitoring device is wirelessly transmitted to a local hub, which, in turn, is configured to automatically transfer the data to a remote server, for example, over a public or private communications network. The server can be configured as a web portal to selectively allow access to such patient physiological data by designated third parties, such as physicians, clinicians, relatives and the patient themselves. The system can provide enhanced functionality relative to known systems, and allows alarms and trends of the physiological data to be selectively generated.

The system can be mainly used in home health care, it can handle selective alarm, but it is not suitable for twoway communication with the patient.

The US 2007/0219830 patent application makes known a system and a method by which a clinician may monitor and communicate with a plurality of remotely located patients. This monitoring may be facilitated using a variety of communication protocols. Modular treatments and institutionally created standards are combined with clinician-provided input and decisions to provide the patient an individualized treatment regimen.

The US 2004/0130446 patent application makes known a wireless communication and global location enabled intelligent health monitoring system. The system comprises a plurality of wireless medical sensor apparatus for measuring a patient's vital signs on different parts of a patient's body, and a main processing unit apparatus containing a System Software that uses an active, real-time monitoring method to process a patient's

vital signs and location information for providing an alert on location and transmitting an emergency request to a remote patient monitoring station for immediate assistance. The key component of main processing unit apparatus is a main microcontroller which is connected to the global position system module. Furthermore the system comprises a long-range two way wireless communication module, a short-range RF receiver, a system main memory, a flash memory, a panic button, an on/off button, an alert beeper and a removable/rechargeable battery. Both global position system module and long-range two-way wireless communication module are connected to multi-band antenna, and system interface processor, and means for conducting two-way wireless communication and GPS data acquisition simultaneously. The short-range RF receiver is connected to the DSP processor, and means for receiving wireless signal from a plurality of wireless medical sensor.

The system uses GPS system for determining position, so basically it is suitable for use outside buildings, eg. in case of a certain given settlement. The system uses the mobile telephone network for data communication, so its use within buildings is not economical. The sensors join the mobile communication device on the patient in a wireless way, which can make measuring, respectively data transmission uncertain.

When working out the solution according to the invention we aimed to create a device and a system, connected with it, that can be used not only in health care institutions, but also in home care of patients, respectively elderly people, permanently monitoring the vital functions of the patient, and in given case generates warning, or alarm resulting in the prompt reaction of professionals to vital dysfunctions, even is they have no visual on the patient. Furthermore we aimed to create a device, that is still able to function when the connection with the centre is broken or suspended, in given case it gives an alert, or makes an alarm, making possible quick, prompt medical treatment.

When creating the solution according to the invention we realized, that if a small device, that can be attached to the patient's body and a system connected with it is created, and the said device measures and compiles data, characteristic of the state of health of the individual, in given case it measures and compiles pulse data, and transmits those to a distant center at certain time intervals determined in advance, furthermore the device itself evaluates continuously the data received on basis of limits set in advance, and in given case generates warning or alarm, then the set aim can be achieved.

The invention is wireless device and data transmitting and processing system connected to the wireless device, for monitoring, and continuous controlling vital functions, said wireless communication device has sensors joining via interfaces suitable for measuring vital functions of patients, and said wireless communication device joins wireless, through WiFi transmission any of the wireless access points of the system, furthermore the system has a central server, which collects, records the data received from certain wireless communication devices, it keeps a logbook on the patients and preferably a personal computer providing control, ensuring data and command input, acting as dispatcher, joins the server. The invention is characterized by that, the characteristic vital functions reference data of the patient associated with the wireless communication

device are set in the wireless communication device, furthermore the data measured by the sensors are continuously measured, stored and forwarded to the central server within certain periods of time, furthermore the wireless communication device continuously compares the data measured with the set reference data, and in case the values are above the limit values, on the one hand it sends local warning signal and/or alarm, on the other hand it forwards the warning signal and/or alarm to the central server.

In one preferred application of the solution according to the invention, the wireless communication device according to the invention is fixed on the body or some of the body parts of the monitored person, or patient, the sensors connected to the wireless communication device through interfaces are fixed to the appropriate body part of the patient to check the patient's vital functions, and the position of the sensors conforms with the place suitable for monitoring the vital functions from a medical aspect.

In another preferred application of the solution according to the invention, a panic button joins the wireless communication device, which offers the possibility of sending a possible alarm signal by the patient, as well as a display offering display of alphanumerical or graphic information, furthermore a voice protocol connected with a microphone and loudspeaker joins the wireless communication device.

In a further preferred application of the solution according to the invention, the wireless access point of the system is a locally installed WiFi device, which joins the central server through a local area network, in given case with wire or wireless transmission, preferably with the help of a virtual private networking device, furthermore the server is in given case connected indirectly or directly with a data network ensuring distant access.

In a further preferred application of the solution according to the invention, the wireless communication device continuously carries out collecting signals from the sensors and compares them with the reference values stored in the wireless communication device, and in case of normal operation, when the wireless communication device is logged in the system, within certain periods of time, in given case in every 15 minutes it sends the data to the central server.

In a further preferred application of the solution according to the invention, in case the value of the vital characteristics measured by any of the sensors differs from the reference value stored in the wireless communication device, then the wireless communication device generates and sends local warning or alarm to the server, depending on the extent of the difference.

In a further preferred application of the solution according to the invention, the local warning signal is a sound and/or light signal, emitted by the loudspeaker of the wireless communication device, furthermore at the same time the display of the wireless communication device on the body of the patient changes to yellow or red conforming with the color of the grade of alert, and at the same time in given case the critical value, type and characteristics appear on the display.

In a further preferred application of the solution according to the invention, the server determines and keeps records of the position and personal details of the patient from the position of the log in.

In a further preferred application of the solution according to the invention, in case the wireless communication device is temporarily not logged in the system, the measuring data are still stored and transmitted to the server at the time of the next log in.

In a further preferred application of the solution according to the invention, the wireless communication device can communicate with the system besides WiFi transmission through complementary ways, by other twoway wireless data transmission method, eg. by GSM data transmission, or Bluetooth data transmission.

The solution according to the invention is set forth on the basis of the attached figures:  
The Fig 1 shows a possible preferable realization and application of the device and system connected to it according to the invention.  
The Fig 2 shows a possible preferable embodiment of the device according to the invention, which is portable and can be fixed on the patient.  
The Fig 3 shows the operational flowchart of the device and data transmitting and data processing system connected to it according to the invention.

The Fig 1 shows a possible preferable realization and application of the wireless communication device WD and system connected to it according to the invention.  
The Fig 1 shows the wireless communication device WD, which is in a box BO, and it is fixed on the body, or body part of the monitored person, or patient. Certain sensors SZ are connected to the device WD through the interface IF, which are fixed to the appropriate body part of the monitored person, or patient to observe their vital functions. The positioning of the sensors SZ conforms with the location of the monitored vital functions determined from doctor's point of view.

The sensors SZ are in given case preferably suitable for the observation of the following vital functions:

- pulse
- oxygen saturation
- blood pressure
- electrocardiograph
- body temperature
- sweat, perspiration
- skin potential
- conductivity
- muscle tone

etc.

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Panic button PN furthermore joins the wireless communication device WD, which offers the possibility of sending an alarm signal by the patient, as well as a display D offering display of alphanumerical or graphic information. It gives the possibility to transmit information, respectively instructions to the patient. Furthermore a voice protocol VP joins the wireless communication device WD to which a microphone M and loudspeaker L are connected. With the help of these devices it is possible to make interactive connection between the monitored person and a central dispatcher, or nurse or doctor through the wireless communication device WD. It allows giving prompt assistance, respectively communicating directly the necessary information or instructions both ways.

In the Fig 1 the access point AP can be furthermore seen, which at the present case is a locally installed WiFi device joining a central server SE through a local area network LAN, in given case with wire or wireless transmission. The Server SE in given case joins directly or indirectly the data network INT providing distant access. It can take place with the help of virtual private networking device VPN, or in such a way, that the server SE joins directly the data network INT. In given case one or more local personal computer PC join the server SE, through which the server SE, as well as the information regarding the monitored people being in it can be accessed by the monitoring person, the dispatcher, respectively the communication can be arranged.

The Fig 2 shows a possible preferable embodiment of the wireless communication device WD according to the invention, which is portable and can be fixed on the patient. The mobile, wireless communication device WD is placed in the box BO. The belt BE ensuring the fixing of the box BO, the fasteners CS, as well as the display D of the wireless communication device WD placed on the external side of the box BO, the microphone M, loudspeaker L, and the panic button PN can be furthermore seen in the figure. The box BO of the wireless communication device WD can be placed the simplest way as a belt pouch on the waist of the monitored patient. It makes possible the visible placement of the display D, as well as the microphone M, the loudspeaker L, as well as the panic button PN on the box BO, ensuring easy access both for the monitored patient and the nurse or supervisors, respectively for third person, the proper detection of alerts and alarms.

The Fig 3 shows the operational flowchart of the wireless communication device WD and data transmitting and data processing system connected to it according to the invention.

The wireless communication device WD realizes the connection to the wireless network basically the usual way. After switch on, the wireless communication device WD logs in the WiFi network, and it is sensed by the central server SE as well. After the log in took place, the central server SE determines the position of the given wireless communication device WD, that is which access point AP the position of the given wireless communication device WD of the patient belongs to. If it is in an institution, then the position of the patient within the institution can be determined. In given case such a system can be installed in an intensive, but not in-patient observation ward. If it

is used at home, then it is definite, that the patient can log in the network at their residence, or in other determined place, sensed by the system as well.

After the log in the measurements start, the signal of the sensors SZ monitoring certain vital functions is continuously monitored, collected and processed, and in given periods is forwarded by the wireless communication device WD.

On basis of the assessment of the data values measured, we can distinguish basically two kinds of alert grade:

- one of them is the yellow alert,
- the other one is the red alert.

The grade of alerts is determined on basis of the extent of deviation of the vital values measured by the sensors SZ, from the defined limit values in the wireless communication device WD set in advance.

The markings in the figure are:

SZ1, SZ2,...SZn – the measuring data of the appropriate sensors

t - time elapsed since the last data communication

T – the frequency of data communication set in the system

SI1, SI2,...SIn – yellow alert interval rendered to the appropriate sensor

PI1, PI2,...PIn - red alert interval rendered to the appropriate sensor

As a first step it has to be decided, whether the value measured is within or outside the given yellow alert range. If it is inside it, then there is an alert event, this case it has to be furthermore decided, if the event falls into the red alert zone, or only into the yellow one. The alert signal is sent accordingly.

The assessment of the grade of alert is made by the wireless communication device WD itself on basis of the limit values and parameters set in advance. The centre registers the values measured, collects, stores them, but the comparison is made definitely by the device on the patient. From this point of view this is an intelligent wireless device. So in the system the functions are divided as follows: the wireless communication device WD measures, compares and forwards, and the central server SE registers, respectively send further alert, warning signal.

If everything goes well, in the usual way, then the wireless communication device WD looks after the collection of the signal of the sensors, the comparison with the stored reference values, does not send an alert signal, but within certain given intervals, in given case in every 15 minutes it transmits the data to the central server SE.

In case of a yellow alert, the wireless communication device WD sends a warning signal to the person on duty, indicates the name, personal details and position of the given patient, as well as the type of the vital function over the given limit. (pulse, blood pressure, etc.) Resulting from it the supervising person can give instructions to the nurse, attendant closest to increase attention to the patient. At the same time the display



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D of the wireless communication device WD changes to the given color, yellow, indicating the person of the patient with problems, in given case the critical value, type and characteristic appear on the display D.

In case of red alert the wireless communication device WD transmits a distress alert to the person on duty, also together with the identifications of the patient, their position and indicating the vital parameter causing the alert. At the same time the display D of the patient changes to red and in given case it gives a sound signal indicating the person of the given patient. Resulting from the distress alert the doctor or nurse closest can immediately find the person with problems, can take necessary action, is aware of the solving of the problem or can offer the necessary help, in given case can call the ambulance, or competent professional staff.

At the end of the alerts the device gets back to normal state, keeping monitoring continuously. In that case, if the device is removed from the patient, then the device is switched off by the competent staff.

In case the connection of the wireless communication device WD with the centre is suspended, or temporarily broken off, for example, because the patient leaves the area covered by the given access point AP, or due to any other reason, for example due to transmission failure, then the wireless communication device WD stores the measured data temporarily, and after the next log in forwards them to the centre. The memories currently available at a low price can store measured data of several days, or weeks. It results in the following consequences:

- The patient is under continuous supervision even if the wireless communication device WD is for whatever reason not logged in the network, eg. it is located in such a place, where there is no access to the system, in the street, or in a different building. However the data are still collected by the wireless communication device WD, are sent at the time of a later log in, so the system has every data on the vital functions of the patient in intervals.

- the wireless communication device WD can make a local alert even if there is no direct connection with the centre. The alert is made by audio and visual display and in given case the function with problems is visualized on the screen, offering possibility for the direct medical treatment, assistance.

- the patient is not limited in his everyday activities, is not bound to a location, and still they are under surveillance. This functioning method offers the patient the possibility to get involved in normal way of life still keeping up continuous control and supervision.

In a concrete realization / application of the solution according to the invention the wireless communication device WD according to the invention makes possible a twoway communication with WiFi transmission, making possible the monitoring and continuous checking the vital functions of certain patients, as well as twoway communication with them. The wireless communication device WD can give an alert directly on the monitored person and/or in the centre of the system. The limit value of

the alert relating the measured values can be set or modified from the distance eg. by a doctor.

The most important characteristics of the wireless communication device WD:

Functions:

- Data processing of the sensors
- Wireless communication preferably with WiFi transmission
- Determination of position in given case – in case of building up of a suitable system
- Making panic alert
- Twoway verbal communication
- Displaying visual information for the patient

Definite realization of the wireless communication device WD:

In given case it is a target device, which is suitable for WiFi transmission, a target computer of PDA type, limited to such functions, that are sufficient to execute the above tasks. From this point of view it is only necessary to provide it with the softwares necessary for the targeted application.

The ways of connection respectively protocols of the wireless communication device WD are:

- standard series connection toward the interfaces IF
- series data connection toward the panic button PN (if the circuit is closed, then a signal is sent)
- standard parallel data connection toward the display D
- standard series data connection toward the voice protocol VP

In case of emergency, the patient can send a distress signal through the panic button PN on the wireless communication device WD by pushing the button, which case the signal is received by the server SE and forwarded to the dispatcher's personal computer PC, which indicates, registers and confirms receipt of the alarm.

In case of a possible, concrete realization of the solution according to the invention, if the device is not used at home, but in a larger building, it is possible for the dispatcher to get information on basis of the distinctive identifier (MAC address) of the device through which access point AP the wireless communication device WD used for logging in, and so it can be determined the location of the received alarm signal, that is, the patient's position can be determined with abt. 10-20m accuracy within the building.

In case the wireless communication device WD according to the invention is used at home, then after the wireless communication device WD logged in the wireless access point AP in the given place, it logs in the distant server SE (with the help of the IP address, name, and password), and the operation furthermore is identical with the above mentioned.

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In case of a concrete realization, the mobile wireless communication device WD contains a battery, a module for connecting to the database network, a marker measuring the pulse, and a couple for a standard oxygen saturation marker, and further sensors, as well as a microcontroller, and it has a distinctive network identifier (MAC address). The microcontroller directs the device. With the help of the mini USB connector the device can be connected to a personal computer. In case the device is connected to a personal computer, or logged in the network, its operation can be adjusted through a web site.

The following parameters can be adjusted during the use of the wireless communication device WD:

- network encryption (WPA or WEP), and the network key
- IP address, sub-network mask (fix, or allocated by DHCP)
- IP address of data receiving server, user name and password for logging in
- At what charge level of the battery should a warning signal start (whistling or through a wireless network)
- A yellow, or red alert value range can be associated with certain sensors, eg. which low or high limit value of the pulse and oxygen saturation should trigger warning or alarm
- The time intervals of the frequency of data sending can be adjusted

The advantageous and preferable applications of the device and system according to the invention:

In health care institutions, care homes

In health care institutions and care homes the precondition of operation is, that the area of the building where the individual, the patient can freely move, should be covered by a wireless system. It can be achieved by installing proper number of wireless access points AP sized conforming with the characteristics of the building. The dispatcher's server SE connected to the local area network LAN receives the data arriving, processes them and does the appropriate functions.

In case it is a big size object, where the wireless communication device WD is applied, and the local area network LAN applied within the object is suitable for determining the position, then in case of an alarm, the patient's position can be determined as well.

In home care

In the home of the individual, patient a permanent Internet access is necessary. It can be ADSL, or Internet service provided by a cable TV network, or by GSM. It is furthermore necessary to have an access point AP connected to the Internet network suitable for WiFi transmission – to which further access points AP can be connected if necessary. The measured data are forwarded to the dispatcher centre after the proper encryption.

For patients in need of monitoring only, but not intensive care, the device according to the invention ensures free movement of the patient, as it is not necessary to be continuously connected to the network.

The advantages of the solution according to the invention are:

The device according to the invention can be used for everybody, whose state of health due to their injuries or illnesses, or the control of the process of their recovery requires permanent monitoring, but no intensive monitoring is necessary. It can be very well used in case of certain heart and circulatory diseases, where a sudden collapse frequently causes problems, and the patient has no time to call for help. In given case the device according to the invention can considerably increase the chance of survival for the patient, respectively it can prevent major deterioration of health conditions.

The device according to the invention is of small size, it can be produced in an embodiment portable on the patient's body. It can not only be applied in health care institutions, but also in the home care of patients respectively elderly people. The data characteristic of the state of health, in given case the data of pulse are measured and collected, then forwarded in certain time intervals, that can be set in advance, to a distant centre, furthermore the device itself can continuously assess the data received on basis of limit values set in advance, and in given case generates a warning or alarm. Resulting from this, with the use of the device the professional staff can promptly react to heart stop, heart attack, or other disorder functioning of the heart, as well as disorders of vital functions which can be concluded from oxygen saturation values, even if they have no visual on the patient.

A further advantage of the device according to the invention is, that it can function even in case the connection with the centre is broken, or suspended, it continuously monitors the patient's state of health, in give case it gives alert or alarm signal, making possible the quick, prompt medical treatment.

The system according to the invention due to its small size can be easily fixed to the body of the patient, to their trunk or upper arm, allowing the patient to move undisturbed, as their temporar movements can be tracked with an accuracy of 10-20m. It is preferable to use sensors, that remain on the body of the monitored individual during his movements as well.

It makes possible the determination of the position of the patient, that at given time where the patient needs the quickest assistance, while with the help of the device according to the invention, the improvement or deterioration of the patient's state of health can be continuously assessed. Taking into consideration the action radius of the WiFi units, its coverage fits well to the human moving space, so it can be applied several places.

The long-term operation time and non-drip finish, as well as stable WiFi connection all contribute to the safe working of the system. The use of the system does not require special skills, it can be easily programmed (eg. USB, or web based administration site). The advantage of the system is, that it can be run on the existing hardware elements, for example via USB port, on web based administration site, resulting in a considerable economical benefit.

The mobile units can have outgoing and ingoing peripherals, with which continuous or temporar data input and output is possible.

The system can be extended as need be (eg. oxygen saturation, electrocardyogram, blood pressure, etc.). The system can not only be used in hospitals, but in care homes or patient's homes as well. In case of home care with the help of the wireless WiFi router installed in apartment, supposing the availability of a permanent Internet connection, the patient can communicate with the dispatcher, where the Internet connection is characteristically ADSL, cable net or GSM based mobile Internet.

The charging of the wireless communication device WD takes place through a mini USB connector. The wireless communication device WD has a distinctive network identifier (MAC address), with the help of which in case of operation even 254 devices in a sub-network, the given device, respectively the patient associated with it can be easily identified.

List of references:

SZ – sensor

IF – interface

WD – wireless communication device

VPN – virtual private networking device

AP – access point

SE – server

PC – personal computer

LAN - local area network

PN – panic button

D – display

VP – voice protocol

INT – data network

M – microphone

L - loudspeaker

BO – box

BE - belt

CS – fastener

**CLAIMS:**

1. Wireless device and data transmitting and processing system connected to the wireless device, for monitoring, and continuous controlling vital functions, said wireless communication device (WD) has sensors (SZ) joining via interfaces (IF) suitable for measuring vital functions of patients, and said wireless communication device (WD) joins wireless, through WiFi transmission any of the wireless access points (AP) of the system, furthermore the system has a central server (SE), which collects, records the data received from certain wireless communication devices (WD), it keeps a logbook on the patients and preferably a personal computer (PC) providing control, ensuring data and command input, acting as dispatcher, joins the server (SE),

characterized by that,

the characteristic vital functions reference data of the patient associated with the wireless communication device (WD) are set in the wireless communication device (WD), furthermore the data measured by the sensors (SZ) are continuously measured, stored and forwarded to the central server (SE) within certain periods of time, furthermore the wireless communication device (WD) continuously compares the data measured with the set reference data, and in case the values are above the limit values, on the one hand it sends local warning signal and/or alarm, on the other hand it forwards the warning signal and/or alarm to the central server (SE).

2. Wireless device and data transmitting and processing system connected to the wireless device according to claim 1, characterized by that, the wireless communication device (WD) according to the invention is fixed on the body or some of the body parts of the monitored person, or patient, the sensors (SZ) connected to the wireless communication device (WD) through interfaces (IF) are fixed to the appropriate body part of the patient to check the patient's vital functions, and the position of the sensors (SZ) conforms with the place suitable for monitoring the vital functions from a medical aspect.

3. Wireless device and data transmitting and processing system connected to the wireless device according to claims 1 or 2, characterized by that, a panic button (PN) joins the wireless communication device (WD), which offers the possibility of sending a possible alarm signal by the patient, as well as a display (D) offering display of alphanumerical or graphic information, furthermore a voice protocol (VP) connected with a microphone (M) and loudspeaker (L) joins the wireless communication device (WD).

4. Wireless device and data transmitting and processing system connected to the wireless device according to any of claims 1-3, characterized by that, the wireless access point (AP) of the system is a locally installed WiFi device, which joins the central server (SE) through a local area network (LAN), in given case with wire or wireless transmission, preferably with the help of a virtual private networking device (VPN),

furthermore the server (SE) is in given case connected indirectly or directly with a data network (INT) ensuring distant access.

5. Wireless device and data transmitting and processing system connected to the wireless device according to any of claims 1- 4, characterized by that, the wireless communication device (WD) continuously carries out collecting signals from the sensors (SZ) and compares them with the reference values stored in the wireless communication device (WD), and in case of normal operation, when the wireless communication device (WD) is logged in the system, within certain periods of time, in given case in every 15 minutes it sends the data to the central server (SE).

6. Wireless device and data transmitting and processing system connected to the wireless device according to any of claims 1-5, characterized by that, in case the value of the vital characteristics measured by any of the sensors (SZ) differs from the reference value stored in the wireless communication device (WD), then the wireless communication device (WD) generates and sends local warning or alarm to the server (SE), depending on the extent of the difference.

7. Wireless device and data transmitting and processing system connected to the wireless device according to claim 6, characterized by that, the local warning signal is a sound and/or light signal, emitted by the loudspeaker (L) of the wireless communication device (WD), furthermore at the same time the display (D) of the wireless communication device (WD) on the body of the patient changes to yellow or red conforming with the color of the grade of alert, and at the same time in given case the critical value, type and characteristics appear on the display (D).

8. Wireless device and data transmitting and processing system connected to the wireless device according to any of claims 1-7, characterized by that, the server (SE) determines and keeps records of the position and personal details of the patient from the position of the log in.

9. Wireless device and data transmitting and processing system connected to the wireless device according to any of claims 1-8, characterized by that, in case the wireless communication device (WD) is temporarily not logged in the system, the measuring data are still stored and transmitted to the server (SE) at the time of the next log in.

10. Wireless device and data transmitting and processing system connected to the wireless device according to any of claims 1-9, characterized by that, the wireless communication device (WD) can communicate with the system besides WiFi transmission through complementary ways, by other twoway wireless data transmission method, eg. by GSM data transmission, or Bluetooth data transmission.



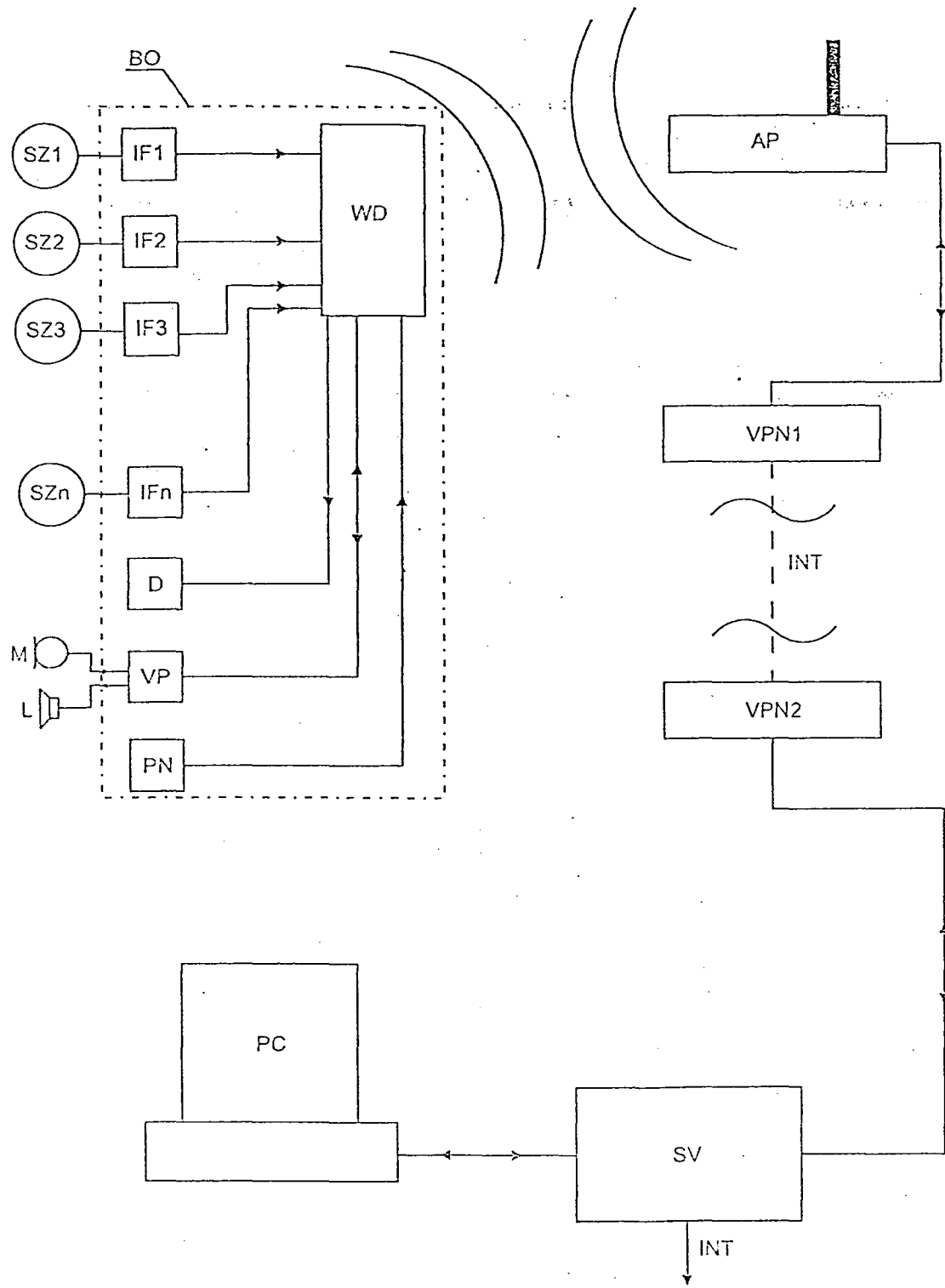


FIG. 1

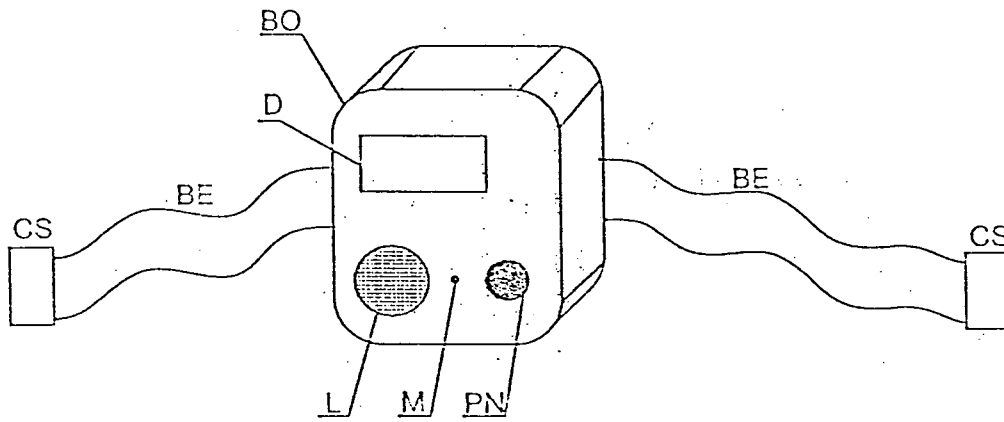


FIG. 2

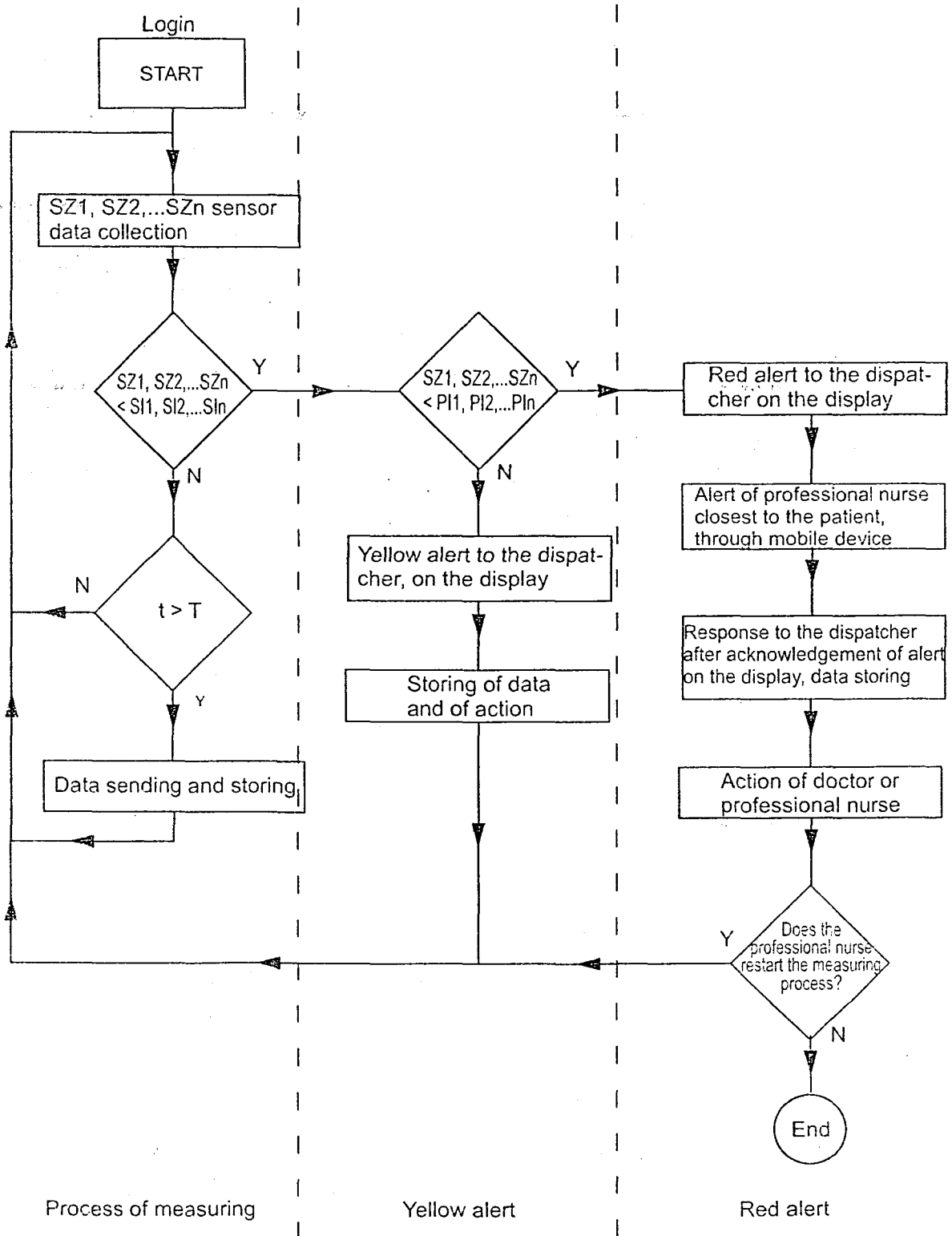


FIG. 3

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/HU2010/000082

**A. CLASSIFICATION OF SUBJECT MATTER**  
INV. G06F19/00  
ADD.

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 practical, search terms used)  
EPO-Internal, INSPEC, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 393 356 A (E SAN LTD [GB]) 24 March 2004 (2004-03-24) page 3, line 2 - page 4, line 30 page 5, line 14 - page 10, line 2	1-10
X	HSI-FENG LU ET AL: "Design of a residential gateway for tele-homecare systems" CONSUMER ELECTRONICS, 2005. (ISCE 2005). PROCEEDINGS OF THE NINTH INTERNATIONAL SYMPOSIUM ON MACAU SAR 14-16 JUNE 2005, PISCATAWAY, NJ, USA, IEEE LNKD-DOI:10.1109/ISCE.2005.1502389, 14 June 2005 (2005-06-14), pages 291-295, XP010832162 ISBN: 978-0-7803-8920-5 page 292; left-hand column, line 21 - page 294, right-hand column, line 23	1-10

Further documents are listed in the continuation of Box C.       See patent family annex.

\* Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>* &amp; * document member of the same patent family</p>
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Date of the actual completion of the international search  <p style="text-align: center;">13 October 2010</p>	Date of mailing of the international search report  <p style="text-align: center;">27/10/2010</p>
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  <p style="text-align: center;">Barba, Michelangelo</p>
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International application No

PCT/HU2010/000082

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X	<p>TIA GAO ET AL: "Wireless Medical Sensor Networks in Emergency Response: Implementation and Pilot Results" TECHNOLOGIES FOR HOMELAND SECURITY, 2008 IEEE CONFERENCE ON, IEEE, PISCATAWAY, NJ, USA, 12 May 2008 (2008-05-12), pages 187-192, XP031266591 ISBN: 978-1-4244-1977-7 page 3, left-hand column, line 40 - page 4, right-hand column, line 41 page 4, right-hand column, line 43 - page 5, right-hand column, line 26</p>	1-10
X	<p>US 2004/199409 A1 (BROWN STEPHEN J [US]) 7 October 2004 (2004-10-07) paragraph [0027] - paragraph [0042] paragraph [0073] - paragraph [0101] paragraph [0104] - paragraph [0113]</p>	1-10
X	<p>O'DONOGHUE J ET AL: "Remote non-intrusive patient monitoring" SMART HOMES AND BEYOND. ICOST 2006 4TH INTERNATIONAL CONFERENCE ON SMART HOMES AND HEALTH TELEMATICS IOS PRESS AMSTERDAM, NETHERLANDS, 2006, pages 180-187, XP002604646 ISBN: 1-58603-623-8 the whole document</p>	1-10
X	<p>PRAVIN PAWAR ET AL: "Context-Aware Middleware Support for the Nomadic Mobile Services on Multi-homed Handheld Mobile Devices" COMPUTERS AND COMMUNICATIONS, 2007. ISCC 2007. IEEE SYMPOSIUM ON, IEEE, PI, 1 July 2007 (2007-07-01), pages 341-348, XP031159779 ISBN: 978-1-4244-1520-5 the whole document</p>	1-10

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International application No

PCT/HU2010/000082

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

International application No

PCT/HU2010/000082

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