

Computer-powered Wireless Ultra-intelligent Real-time vital signs monitor

www.MyPulseMonitor.com

December 2004 Patent no. 6897773

*Advanced home Edition Short-range monitor, Long-range monitor.
Professional Edition Short-range monitor, Long-range monitor.*

**This monitor is a reference device.
Scroll down to see illustrations of various applications.**

General User Information

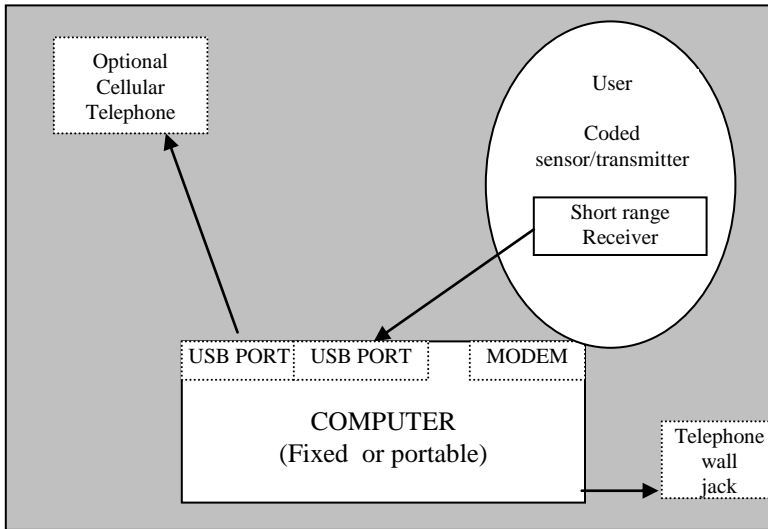
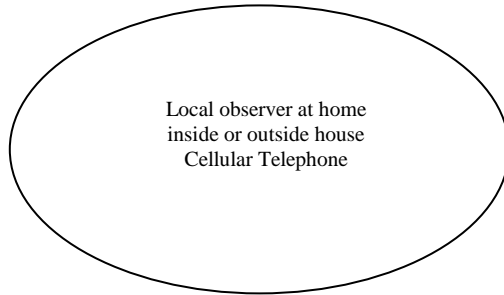
- Non-invasive. No wires to restrict movement or cause harm. No gels to irritate the skin. Light weight. Waterproof. No batteries to change.
- The 3-foot short-range wireless monitor for use in a confined area.
- The 1000-foot long-range wireless monitor gives an adult freedom to walk around in the house or do some gardening, go shopping, or go on a picnic.
- Data are archived over twelve months for historical review of cardiac rehabilitation.
- Clearly labeled, easy to read continuous charts (e.g. Heart rate & oxygen saturation).
- Automatically calibrates to child, adult, male & female norms. Automatically adjusts to individual personal characteristics.
- If it detects abnormal values or changes on any chart, or if the monitor is removed, disconnected or travels outside a predetermined range, it will automatically create sound and color alarms that are audible and visible from a distance. A persistent abnormal condition will lead to automatic pager/beeper or phone notification. The progressive graduated alarm system provides early rather than late warning.
- Up to date charts may be viewed via the internet and emailed and/or faxed to a medical professional.

Professional User Information

- Multiple user Integrated Physical Trainer's Station.
- User administrative data are stored along with historical data.
- Separates charts into internal biological effects and external environmental effects, in terms of actual values and standard deviations, to speed up and improve data analysis. Spectral analysis of any desired transformation of any segment of 24-hour beat-to-beat heart rate data and inter-beat (time between beats) data.
- Easy to use and ideal for supervised exercise at a medical establishment or at home. Due to very low frequency {5kHz} and short range {3feet}, interference with other equipment at a hospital, nursing home or gymnasium is easily avoided.

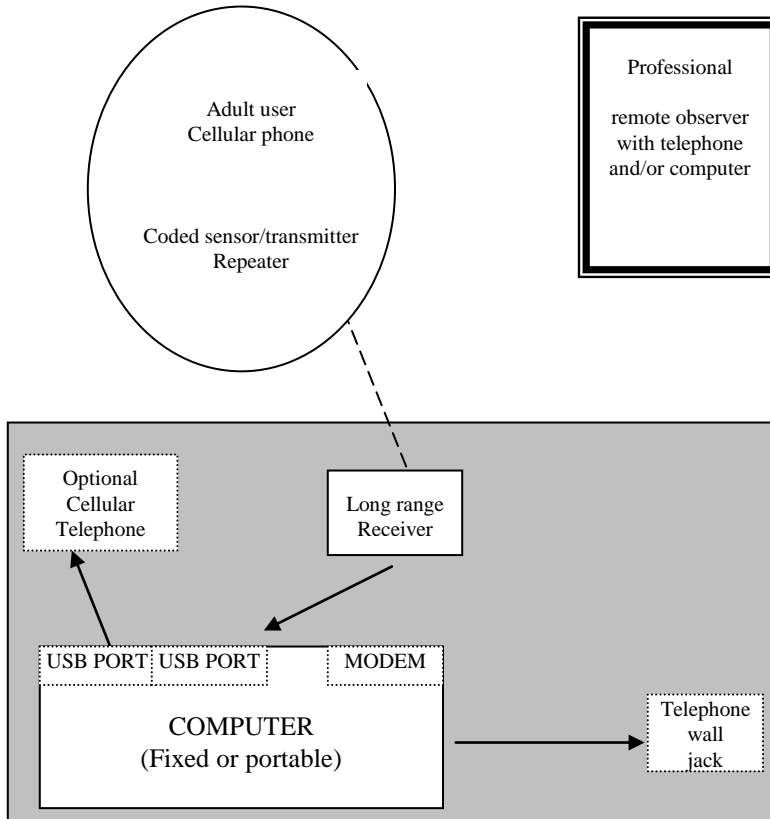
**SHORT RANGE
COMPUTER-POWERED WIRELESS ULTRA-INTELLIGENT REAL-TIME MONITOR
SINGLE HOME USER**

User is confined to 3ft radius but can adjust their body position completely free of wires.
If the computer is portable & powered by a motorcar battery, then travel is possible.



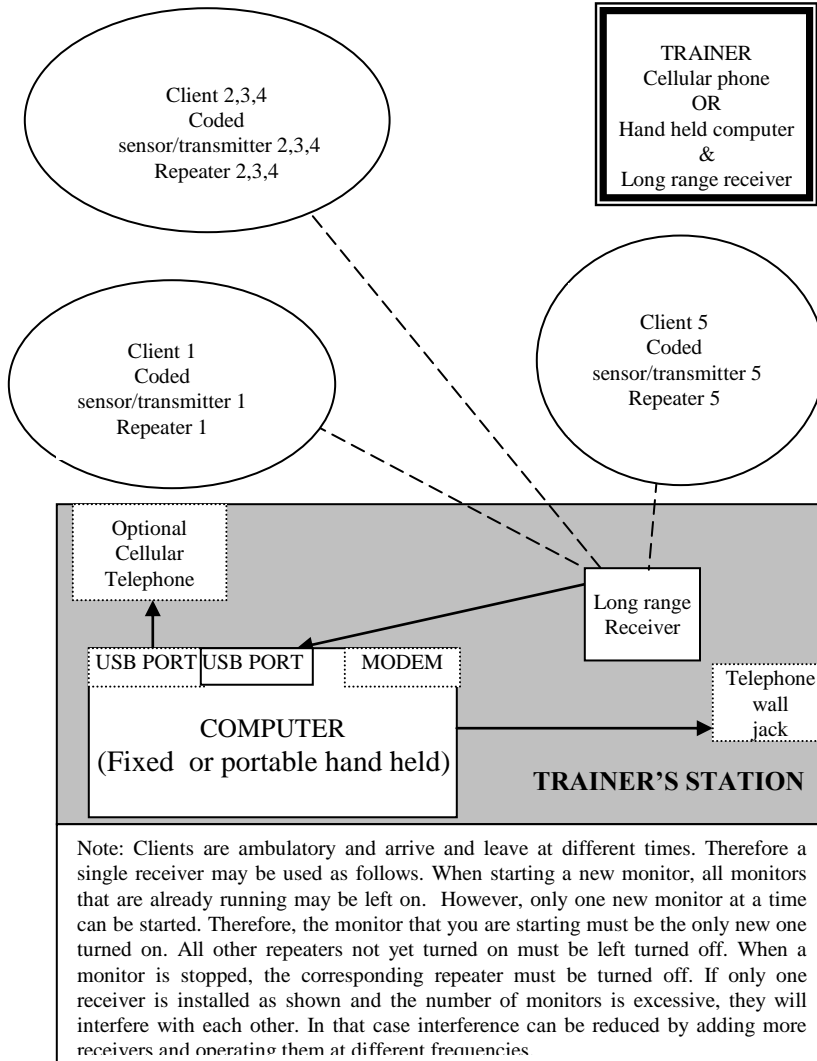
**LONG RANGE
COMPUTER-POWERED WIRELESS ULTRA-INTELLIGENT REAL-TIME MONITOR
SINGLE HOME USER**

Home adult user can move about inside and outside of home completely free of wires.
If the computer is portable & powered by a motorcar battery, then travel is possible
(e.g. shopping, picnic, etc.).



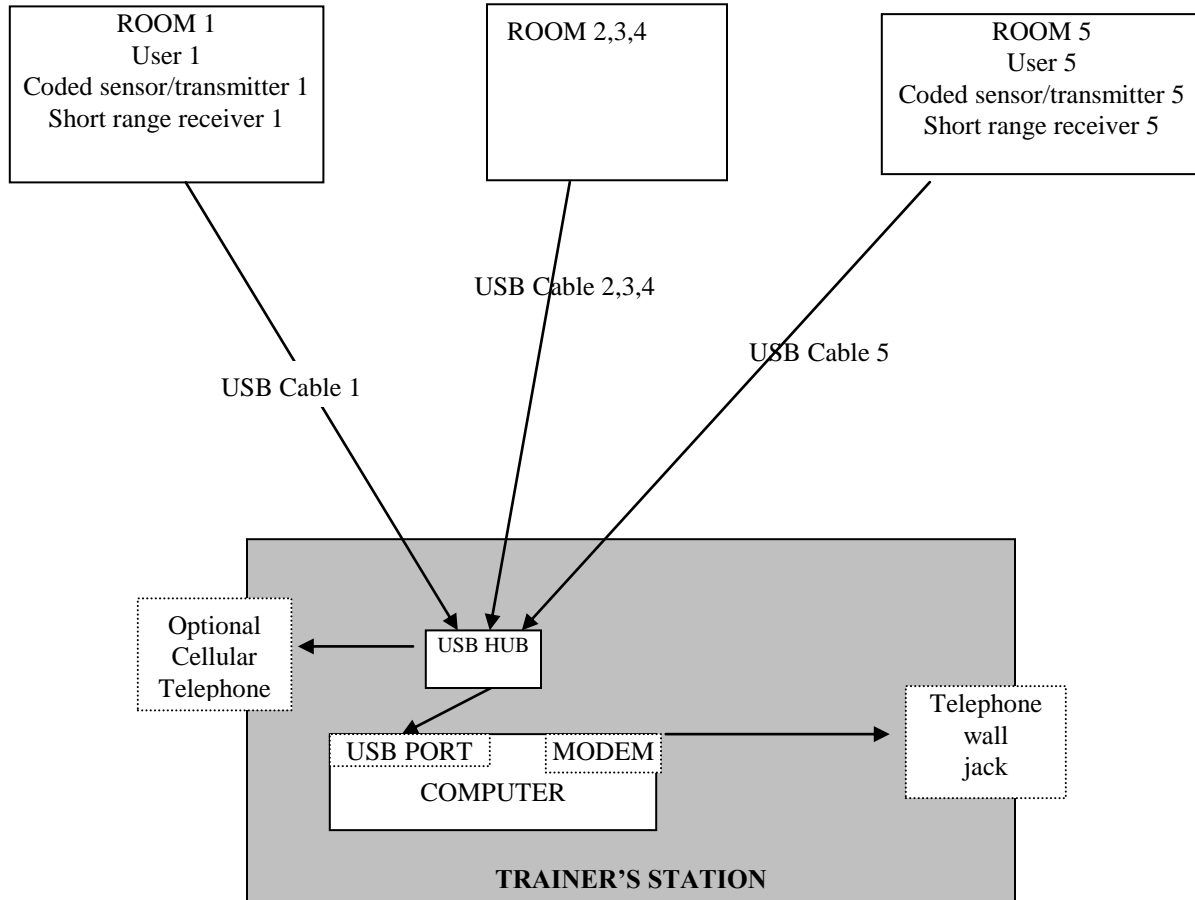
LONG RANGE COMPUTER-POWERED WIRELESS ULTRA-INTELLIGENT REAL-TIME MONITOR GYMNASIUM

Clients can move about (at least 3ft apart from each other) completely free of wires.



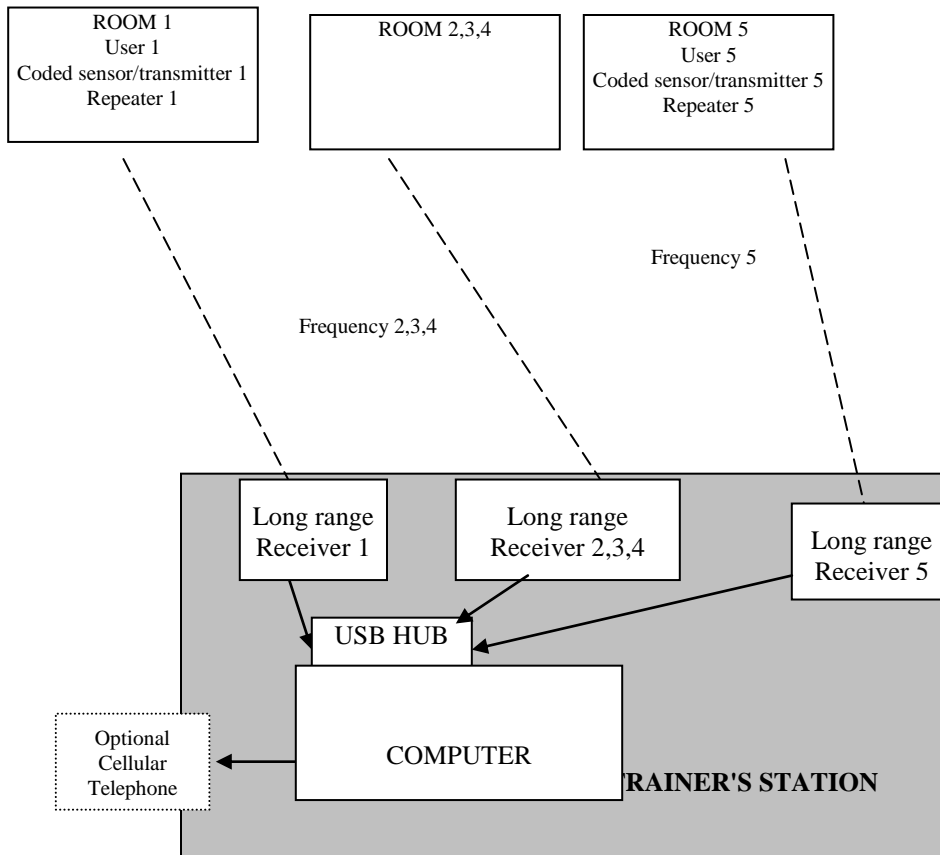
**SHORT RANGE
COMPUTER-POWERED WIRELESS ULTRA-INTELLIGENT REAL-TIME MONITOR
EXERCISE GUIDANCE
HOSPITAL or NURSING HOME**

Clients are exercising (at least 3ft apart) in a confined area completely free of wires.



**LONG RANGE
COMPUTER-POWERED WIRELESS ULTRA-INTELLIGENT REAL-TIME MONITOR
EXERCISE GUIDANCE
HOSPITAL or NURSING HOME**

Clients can lie down, sit up, or walk about (at least 3 ft apart from each other) completely free of wires.



**COMPUTER POWERED
WIRELESS ULTRA-INTELLIGENT
REAL TIME**

VITAL SIGNS MONITOR

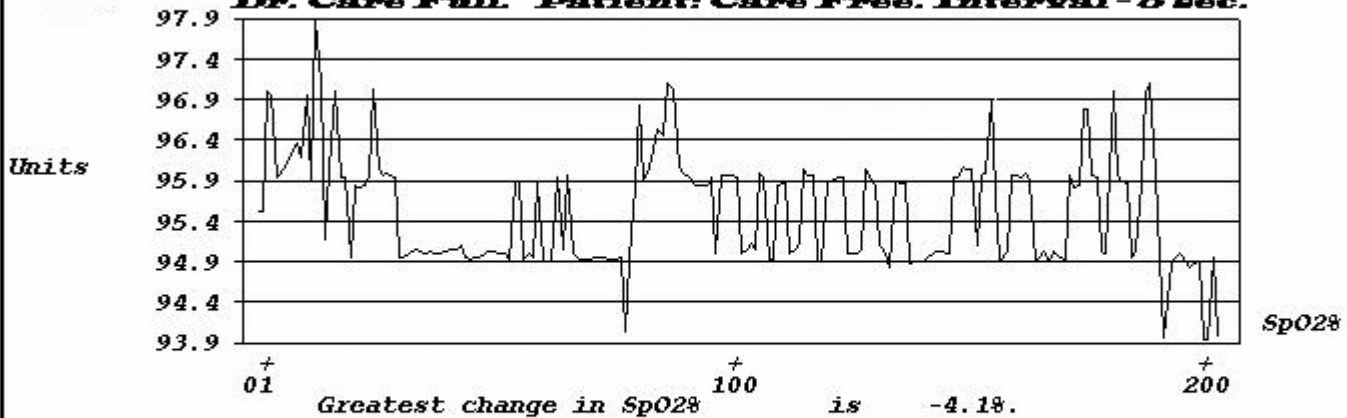
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Time series analysis may be applied to biomedical data. The data in the charts below are two examples, obtained in real time from a pulse oximeter. The information provided on this website, including the charts, a training test, case study, and computer software are intended for educational use.

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COMMON CAUSE VARIATIONS

Dr. Care Full Patient: Care Free. Interval = 5 sec.



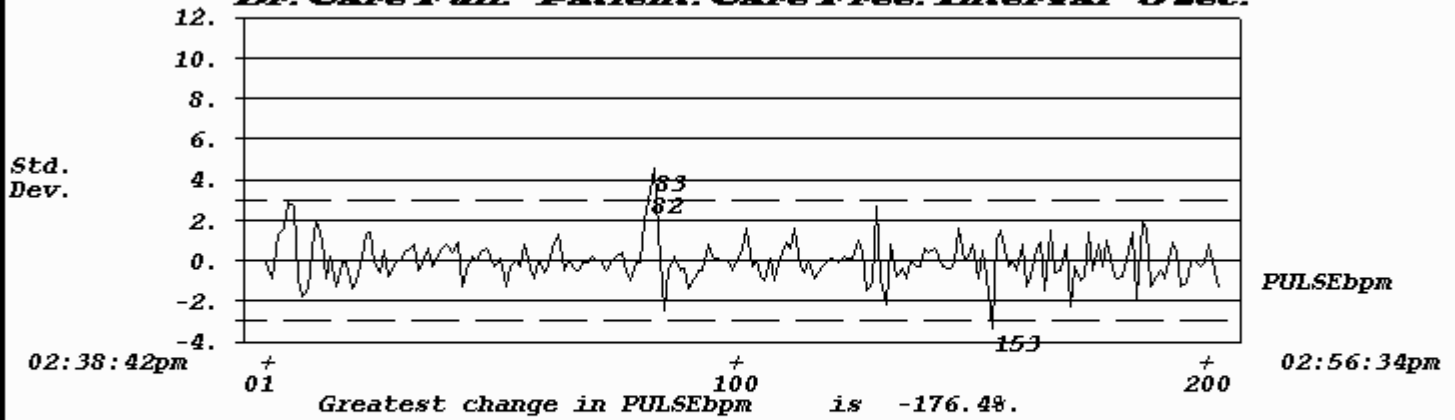
Chi Squared(7,58)=64.977>14 Failed test for normality.
Mean=95.533 Root Mean Sq. Dev.=0.694 Min.=93.945 Max.=97.913
Control limits=(85.000,100.000)units =(-15.184,6.439)std. dev.
Number of breaches: Upper=0 =0.00% Lower=0 =0.00% Total=0 =0.00%

Examine the common cause charts.

If any plotted data point falls outside the control limits, investigate the cause. If there is a recognizable pattern, attempt to associate the pattern with its probable cause.

SPECIAL CAUSE VARIATIONS

Dr. Care Full Patient: Care Free. Interval = 5 sec.



Chi Squared(7,5%)=26.360>14 Failed test for normality.

Mean=0.000 Root Mean Sq. Dev.=1.000 Min.=-3.402 Max.=4.457

Control limits=(-3.000,3.000)std. dev. =(-6.716,6.716)units

Number of breaches: Upper=2 =1.01% Lower=1 =0.51% Total=3 =1.52%

Examine the special cause charts.

If any plotted data point falls outside the control limits, investigate the cause. Since the data on this chart are independent, consider special one of a kind causes, such as temporary mental or physical exertion. Something that will not necessarily happen again, or happen in the same way.



Time series analysis has many applications. How it is applied, depends very much on the particular application. The following information is intended as a guide to biomedical process control applications. Process control by a simple control chart of a process variable, is based on the assumption that process measurements result in a sequence of numbers that are unrelated to each other. Biomedical vital signs data are not unrelated. They are correlated (systematic). These systematic effects are called common cause internal biological effects. In addition to these systematic effects, the data will contain unsystematic random one of a kind special effects. These may be due to a loud sound, a bright light, temporary mental or physical exertion, etc. These are called special cause external environmental effects. The common cause effects are normally confounded with the special cause effects. This makes it difficult to determine the internal biological effects. The result is unnecessary intervention (false positives) and misdirection, and real problems being overlooked in other cases (false negatives).



The objective of time series model based biomedical process control is to separate the data into two components namely the common cause internal biological effects and the special cause external environmental effects. These two components are plotted on separate charts. This makes it possible to better understand the data. Time domain time series models are limited in their ability to represent periodic (cyclical) components in the data. The moving window spectral antithetic time series model is a frequency domain approach. It is an extension of the time series concept to a generalized automatic system that further decomposes the process variable into trend, periodic components and residuals. However, the main objective of this information is an examination of the way in which we view this application, and in general, the role of time series analysis *common cause charts* and *special cause charts*.



Summary of suggested rules for implementing a biomedical charting plan

ASSUMPTION: Biomedical data are made up of a common cause internal biological component and a special cause external environmental component.

Each component is plotted on its own chart. The charts are marked with upper and lower standard values, depending on age and sex, for a normal healthy person. Since standard upper and lower limits assume that one size fits all persons within an age and sex classification, a second set of charts are plotted in terms of standard deviations. These are marked with upper and lower 3 (for example) standard deviation control limits. Once the common cause component is separated from the special cause component, the standard deviation for the special cause chart is reduced, the width of the 3 standard deviation limits narrows, and the chart becomes more discriminating. The common cause and special cause charts are continuously updated and made available for the following purpose.

1. Examine the special cause charts.

If any plotted data point falls outside the control limits, investigate the cause. Since the data on this chart are independent, consider special one of a kind causes, such as temporary mental or physical exertion. Something that will not necessarily happen again, or happen in the same way.

2. Examine the common cause charts.

If any plotted data point falls outside the control limits, investigate the cause. If there is a recognizable pattern, attempt to associate the pattern with its probable cause.