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Pulse Oximeter System

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Abstract: A person's heart forces the blood to flow through the arteries. As a result the arteries throb in sync with the beating of the heart. This throbbing can be felt at the person's wrist and other places over the body.Electronically this throbbing can be sensed using LDR and LED sensor. The LDR resistance changes with the intensity of the light falling on its surface. The variations in the light intensity due to blood flow are exploited in this project.The counter is configured such that it counts the pulses for 1 minute. The process is initiated by a start condition and the count terminates at the end of 60 seconds. The result is displayed on the LCD.Although the pulse rate can be manually measured by us, an electronic digital heart beat counter gives the opportunity to measure tit automatically and continuously. Our heart beat monitor has the following salient features like Light dependent resistor is used as transducer, blinking LED for visual indication of heat beats,counts are automatic and are displayed on LCD, Continuous monitoring can be done, the processed signal can be fed to data logger for future reference, Works on AC mains or batteries.

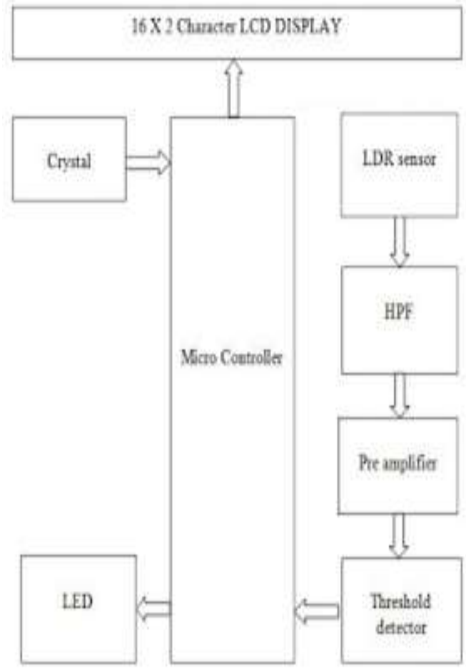
Description:

Design of model bio-telemetric system is embedded system of distributed nature aimed at monitoring of patient's vital functions, among others heart rate and Carbon dioxide saturation. Model bio-telemetric system can be partitioned into two basic parts. Inner part located in patient's home and outer part located in monitoring centre. Both parts are sub partitioned into participating elements. Inner part of model bio-telemetric system is located in space where patient spends most of his time. Main purpose of this subsystem is to acquire bio-telemetric data and to hand them over to outer part of model bio-telemetric system.

The future will see the integration of the abundance of existing specialized medical technology with pervasive, wireless networks. They will co-exist with the installed infrastructure, augmenting data collection and real-time response. An example of area in which future medical systems can benefit the most from wireless sensor networks is in-home assistance. In-home pervasive networks may assist residents by providing memory enhancement, control of home appliances, medical data lookup, and emergency communication.

Block diagram:

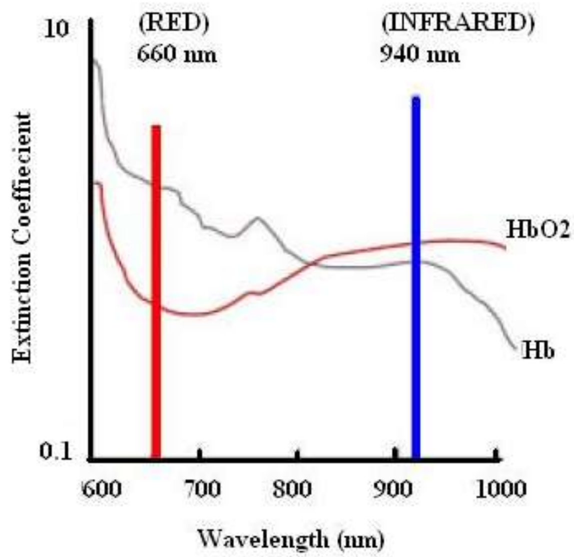
When the load is removing from a switching mode power supply with a LC low-pass output filter, the only thing the control loop can do is stop the switching action so no more energy is taken from the source. The energy that is stored in the output filter inductor is dumped into the output capacitor causing a voltage overshoot. The magnitude of the overshoot is the vector sum of two orthogonal voltages, the output voltage before the load is removed and the current through the inductor times the characteristic impedance of the output filter, Zo = (L/C)^1/2.



Block diagram of Micro Controller and sensors

Implementation:

The principle of pulse oximetry is based on the red and infrared light absorption characteristics of oxygenated and deoxygenated hemoglobin. Oxygenated hemoglobin absorbs more infrared light and allows more red light to pass through. Deoxygenated (or reduced) hemoglobin absorbs more red light and allows more infrared light to pass through. Red light is in the 600-750 nm wavelength light band. Infrared light is in the 850-1000 nm wavelength light band. he use of pulse oximeters is limited by a number of factors: they are set up to measure oxygenated and deoxygenated haemoglobin, but no provision is made for measurement error in the presence of dyshemoglobin moieties – such as carboxyhemoglobin (COHb) and methemoglobinemia. COHb absorbs red light as well as HbO, and saturation levels are grossly over-represented.



Arterial gas analysis or use of co-oximetery is essential in this situation. Co-oximeters measure reduced haemoglobin, HbO, COHb and methemoglobin. Abnormal movement, such as occurs with agitated patients, will cause interference with SpO_2 measurement. Low blood flow, hypotension, vasoconstriction and hypothermia will reduce the pulsatility of capillary blood, and the pulse-oximeter will under-read or not read at all.

Conversely, increased venous pulsation, such as occurs with tricuspid regurgitation, may be misread by the pulse-oximeter as arterial blood, with a low resultant reading. Finally, it is generally accepted that the percentage saturation is unreliably reported on the steep part of the oxyhemoglobin dissociation curve. While the trend between the SaO_2 (arterial saturation) and SpO_2 appears accurate, the correlation between the two numbers is not. Thus a drop in the SpO_2 below 90% must be considered a significant clinical event.

Conclusion

This results in accurate measurement of heart beat and it detects hypoxemia ,which is caused due to deficiency of oxygen content in blood.The P.O. Pro is a wireless solution to every household allowing parents to monitor their child's pulse rate and blood oxygen content. This design will provide this information wirelessly giving flexibility to the parents. The product displays information in a straightforward manner to ease interpretation of the information by the users. This product will be readily available to the general public at retail stores at a competitive price.

The final product will consist of a sensor module, a monitor and an alarm. A watch shaped sensor module which will be placed on the infant's ankle will transmit data to the monitor which can be place within thirty feet from the sensor. This monitor will transmit data to the beeper like alarm that can be carried around by the caretaker provided it is within one hundred feet of the monitor. The alarm will sound if an abnormal level of oxygen or pulse rate is detected or if the battery is low. In addition to infants and toddlers being the primary target, the product is designed in such a way that it can easily be modified to other target age groups.

REFERENCES:

[1] A. Milenkovic, C. Otto, and E. Jovanov, "Wireless Sensor Networks for Personal Health Monitoring: Issues and an Implementation," in *Computer Communications*, vol. 29 (13- 14), August 2006.

[2] Y. Shieh, Y. Tsai, A. Anavim, M. Shieh, and M. Lin, "Mobile Healthcare: Opportunities and Challenges," in *International Journal of Electronic Healthcare*, 4(2), 208-219, 2008.

[3] F. Tay, D. Guo, L. Xu, M. Nyan, and K. Yap, "MEMS Wearbiomonitoring System for Remote Vital Signs Monitoring," in *Journal of the Franklin Institute*, 346(6), 531-542, August 2009.

[4] A. Sagahyroon, H. Raddy, A. Ghazy, and U. Suleman, "Design and Implementation of a Healthcare Monitoring System," in *International. Journal of Electronic Healthcare*, 5(1), 68-86, 2009.

[5] K. Takizawa, Huan-Bang, L. Kiyoshi, H. Kohno, "Wireless Vital Sign Monitoring using Ultra Wideband-Based Personal Area Networks," in Proc. of the *International Conference of the IEEE Engineering Medicine in Biology Society*, 1798-1801, August 2007.

[6] S. Sneha and U. Varshney, "A Wireless ECG Monitoring System for Pervasive Healthcare," in *International Journal of Electronic Healthcare*, 3(1), 32-50, 2007.

[7] Y. Zhang and H. Xiao, "Bluetooth-Based Sensor Network for Remotely Monitoring the Physiological Signals of Patient," in *IEEE Trans. on Information Technology in Biomedicine*, 13(6), 1040-1048, November 2009