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Wearable Physiological Parameters Monitoring System Using WiFi as a Communication Medium on ARM7

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Abstract: *In recent times, wireless sensors and sensor networks have become a great interest to research, scientific and technological community. Though sensor networks have been in place for more than a few decades now, the wireless domain has opened up a whole new application space of sensors. Wireless sensors and sensor networks are different from traditional wire-less networks as well computer networks and, therefore, pose more challenges to solve such as limited energy, restricted life time, etc. Wireless sensing units integrate wireless communications and mobile computing with transducers to deliver a sensor plat-form which is inexpensive to install in numerous applications. Indeed, co-locating computational power and radio frequency (RF) communication within the sensor unit itself is a distinct feature of wireless sensing.*

Keywords: *Sensor Network, Wireless Communication.*

1. INTRODUCTION

WiFi Technology is a proficient used by mobiles, workplaces, home and computer systems all around the world. WiFi Technology is a spectrum radio technology and OFDM radio technology therefore it is an alternate of wireless LAN'. **WiFi Technology** based on the IEEE 802.11and WiFi Technology Alliance so we can say that it is a synonym of IEEE 802.11. WiFi Technology is executing by remote supervising structure like as security and medicine. Today, the progress in science and technology offers miniaturization, speed, intelligence, sophistication, and new materials at lower cost, resulting in the development of various high-performance smart sensing system. Many new research is focused at improving quality of human life in terms of health by designing and fabricating sensors which are either in direct contact with the human body (invasive) or indirectly (noninvasive).

2. PROPOSED SYSTEM

In this project we are implementing Wearable Physiological parameters like Temperature, Heartbeat, pulse Oximetry and impact sensors which can wearable. These sensors are interfaced to ARM7 Based LPC2148 microcontroller which is inbuilt with 10-bit 14 channel ADCs. The sensors Data after conversion Monitored by the concerned Person via WiFi as a communication medium. The Converted Data is transmitted to the concerned person place using WiFi; there another LPC2148 microcontroller is interfaced with PC and WiFi Module. Keil cross compiler will be used for building the applications. LPC2148 development board will be used to test the built application. Flash magic software is used to dump the .Hex file in to the Microcontroller.

Block Diagram

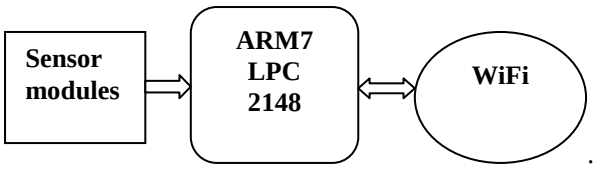

Fig1. *Patient Node*

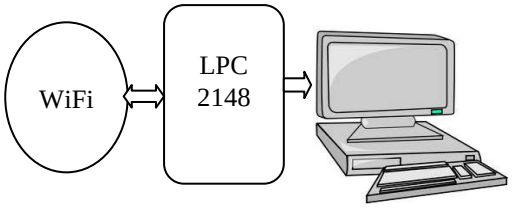

Fig2. *Observer Unit*

3. HARDWARE IMPLEMENTATION

3.1. LPC2148 Microcontroller

LPC2148 microcontrollers are based on a 32 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support that combines the microcontroller with embedded high speed flash memory of 512kb. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces the code by more than 30% with minimal performance penalty.

3.2. Heart Beat Sensor

The device consists of an infrared transmitter LED and an infrared sensor photo-transistor. The transmitter-sensor pair is clipped on one of the fingers of the subject. The LED emits infrared light to the finger of the subject. The photo-transistor detects this light beam and measures the change of blood volume through the finger artery. This signal, which is in the form of pulses is then amplified and filtered suitably and is fed to a low-cost microcontroller for analysis and display. The microcontroller counts the number of pulses over a fixed time interval and thus obtains the heart rate of the subject. Several such readings are obtained over a known period of time and the results are averaged to give a more accurate reading of the heart rate. The calculated heart rate is displayed on an LCD in beats-per-minute in the following format:

Rate = nnn bpm

Where *nnn* is an integer between 1 and 999.

3.3. Pulse Oximetry Sensor

Use of light to measure blood oxygen saturation and heart rate is called Pulse Oximetry, and is a field of study where abundant research has been done in the past few decades. Pulse Oximetry relies on measurement of a physiological signal called Photo plethysmo grpahy (PPG), which is an optical measurement of the change in blood volume in the arteries. Pulse Oximetry acquires PPG signals by irradiating two different wavelengths of light through the tissue, and compares the light absorption characteristics of blood under these wavelengths. The comparison leads to a measurement of the oxygenation of blood and is reported as blood oxygen saturation

3.4. PH Level Sensor

For ph sensor we are using three Led's red, green, blue and one LDR.

LDR Color Sensor: A Color sensor using a standard LDR and the RGB Color Model.

One way of building an active color sensor is to use the RGB color model, which defines all colors as an additive combination of the primary colors: Red, Green and Blue. The sensor consists of a normal Light Dependent Resistor (LDR), surrounded by Red, Green and Blue Led's.

The exterior of the sensor is covered in black insulating tape, to cut out all ambient light from interfering with the LDR. This is important, as ambient light can wreak havoc on the readings. The LDR is connected with an appropriate resistance, so as to divide the reference voltage (5V) between itself and the fixed resistor. As the light intensity varies, so does the voltage across the LDR. The key idea is to record the voltage across the LDR when the object is illuminated by one of the three colors, and use that to figure out the color of the object.

4. HARDWARE & RESULTS

In the WiFi client node we are receiving the patient health details which are being monitored. This unit can be placed at doctor's place

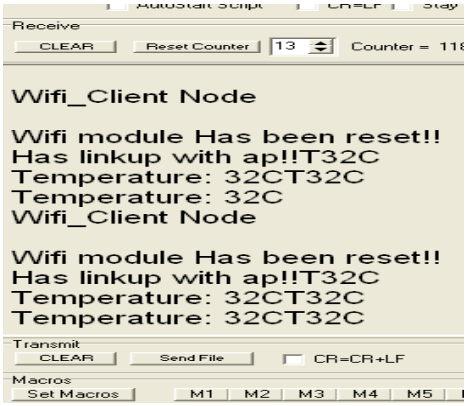

Fig3. *WiFi Client Node*

In the central station the parameters for checking up the Patient health

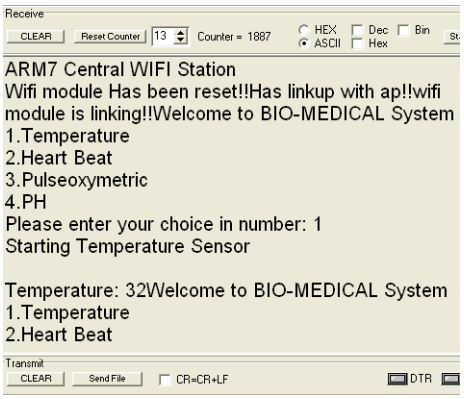

Fig4. *Central WiFi Station*

Here in Patient node the readings are read from the terminal

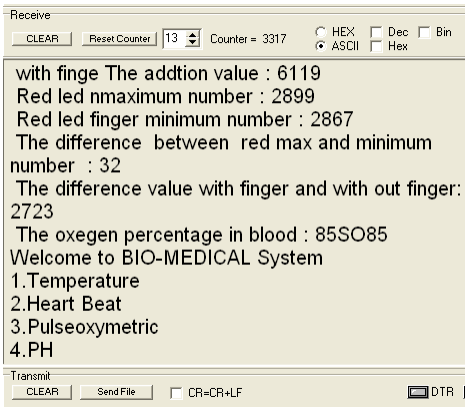

Fig5. *Patient Node*

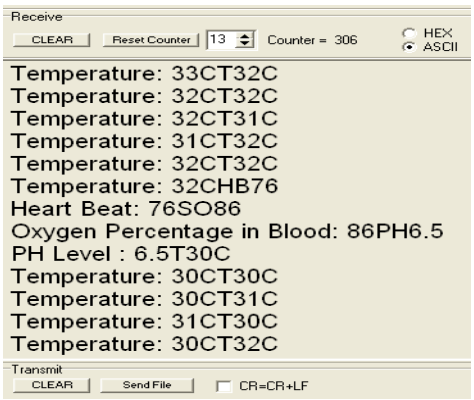

Fig6. *Observations*

REFERENCES

[1] E. P. Scilingo, A. Lanat`a, and A. Tognetti, "Sensors for wearable systems," in Wearable Monitoring Systems. Springer, 2011, pp. 3–25.

[2] A. Lanata, G. Valenza, and E. P. Scilingo, "Eye gaze patterns in emotional pictures," Journal of Ambient Intelligence and Humanized Computing, pp. 1–11, 2012.

[3] R. G. Haahr, S. B. Duun, M. H. Toft, B. Belhage, J. Larsen, K. Birkelund, and E. V. Thomsen, "An electronic patch for wearable health monitoring by reflectance pulse oximetry," Biomedical Circuits and Systems, IEEE Transactions on, vol. 6, no. 1, pp. 45–53, 2012.

[4] M. Tavakoli, L. Turicchia, and R. Sarpeshkar, "An ultra-low-power pulse oximeter implemented with an energy-efficient transimpedance amplifier," Biomedical Circuits and Systems, IEEE Transactions on, vol. 4, no. 1, pp. 27–38, 2010.

[5] F. Zhang and Y. Lian, "Qrs detection based on multiscale mathematical morphology for wearable ecg devices in body area networks," Biomedical Circuits and Systems, IEEE Transactions on, vol. 3, no. 4, pp. 220–228, 2009.

[6] E. P. Scilingo, A. Gemignani, R. Paradiso, N. Taccini, B. Ghelarducci, and D. De Rossi, "Performance evaluation of sensing fabrics for monitoring physiological and biomechanical variables," Information Technology in Biomedicine, IEEE Transactions on, vol. 9, no. 3, pp. 345–352, 2005.

[7] A. Lanat`a, E. P. Scilingo, E. Nardini, G. Loriga, R. Paradiso, and D. DeRossi, "Comparative evaluation of susceptibility to motion artifact in different wearable systems for monitoring respiratory rate," Information Technology in Biomedicine, IEEE Transactions on, vol. 14, no. 2, pp. 378–386, 2010.

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