An Experimental Investigation of Pulse Measurement by Means of a Plethysmographic Sensor Integrated in a ZigBee Medical Network

Cristina Marghescu, Faculty of Electronics, Telecommunications and Information Technology, University “Politehnica” of Bucharest, Bucharest, Romania

Mihaela Pantazica, Faculty of Electronics, Telecommunications and Information Technology, University “Politehnica” of Bucharest, Bucharest, Romania

Sever Pasca, Faculty of Electronics, Telecommunications and Information Technology, University “Politehnica” of Bucharest, Bucharest, Romania

ABSTRACT

This paper aims to investigate the performance of a system consisting of plethysmographic sensors used to measure the human pulse (or heart rate), and ZigBee wireless networks used to collect the data in view of processing and storing. A demo system build around a MICROCHIP development kit (PICDEM Z) is described. Some conclusion derived on the basis of the observations obtained during the implementation of the demo system and during the measurement campaign are given.

Keywords: Heart Rate, Medical, Plethysmographic, Pulse, ZigBee

INTRODUCTION

In this paper we intend to analyze a couple of issues regarding the use of ZigBee technology to collect data on pulse using the plethysmographic method. A block diagram of the module that includes the sensor is provided in Figure 1.

Before being sampled and quantized the signal delivered by the sensor is processed by means of a conditioning circuit which usually provides amplification and filtering. Most biological signals are small amplitude signals – an amplification stage must therefore be used. Filtering is also an important step because the
signals are low level and in the presence of wide band noise the risk of erroneous interpretation increases. The analog signal will be Analog to Digital Converted (ADC) and transmitted using a microcontroller and a ZigBee transceiver. To build the experimental model we used a Microchip development kit. The sensor-ZigBee module transmits the data packet to a central point that consists of a network coordinator and a computer (Figure 2) to further process and store collected data.

Section “Other Research Activities in this Area of Interest” aims to present the state of the art in the development of mobile health applications. Some basic aspects related to the plethysmographic measurement of the heart rate and to ZigBee technology are summarized in section “Basic Aspects of the Technologies involved in the Proposed Implementation”. Experimental issues such as: software modules, MATLAB data processing, performance requirements and performance achieved by the conditioning circuit, the influence of various parameters on the global performance achieved, etc. are described in sections: “The Implementation of the Demo Setup” and “Experimental Results and Conclusions”.

OTHER RESEARCH ACTIVITIES IN THIS AREA OF INTEREST

Healthcare continues to be an important field of study and concerns regarding aging in the western world and possibilities of tele-medicine are high on the list of subjects of interest. In order to give access to care for a higher number of patients a possible solution for monitoring at home or through a network is needed. Through the development of equipments for wireless data transmission and through improvements in data processing capabilities as well as the continuous evolution of manufacturing technologies used for medical sensors, objectives...
An Experimental Investigation of Pulse Measurement by Means of a Plethysmographic Sensor Integrated in a ZigBee Medical Network

Backpropagation Neural Network for Interval Prediction of Three-Phase Ampacity Level in Power Systems
www.igi-global.com/article/backpropagation-neural-network-for-interval-prediction-of-three-phase-ampacity-level-in-power-systems/177208?camid=4v1a