Smart sensors and pervasive computing for healthcare

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The latest developments in the field of sensing, smart sensors, communication protocols and human machine interface, and also the aim of decreasing the health services cost and increasing the quality of the provided services create the premises for new types of interactions among health providers and people, among patients, among patients and researchers and among patients and corporations. As important components of new healthcare systems, smart sensing platforms based on wearable or smart objects solutions allow the vital signs and motor activity monitoring in patients without higher interferences in their daily activities. In this paper is presented a practical approach concerning smart sensing and embedded processing platforms as part of vital sign monitoring system for patients with limited mobility using walking aids. Several experimental results concerning cardiac and motor activity monitoring using developed platforms associated with smart objects such wheelchair are presented.

Published in: 2013 E-Health and Bioengineering Conference (EHB)

Date of Conference: 21-23 Nov. 2013

Date Added to IEEE *Xplore*: 09 January 2014

ISBN Information:

INSPEC Accession Number: 14029264

DOI: 10.1109/EHB.2013.6707281

Publisher: IEEE

Conference Location: Iasi, Romania

Contents

A major challenge for healthcare is how to provide improved services to an increasing number of people using limited financial and human resources. A modern healthcare service includes the following components: prevention, healthcare maintenance and checkups, short-term monitoring or home healthcare monitoring, long-term monitoring in nursing home, personalized healthcare monitoring, incidence detection and management, and emergency intervention, transportation and treatment. These components could be effectively supported by universal, efficient and reliable access to healthcare services through the application of information and communication technologies that assure the availability of medical information at any place and at any time in a pervasive way [1], which is a new trend considered by the healthcare service providers. This trend is expressed by increasingly instrumented environments and deployment of a seemingly invisible infrastructure of various wired and/or wireless networks and communication/computing devices, integrated in our daily life, that facilitate interaction with a smart environment from everywhere. Recent advances in pervasive sensing, mobile, and pervasive computing technologies have led to deployment of new smart sensors and smart sensor networks architectures that can be worn or integrated within the living environment to perform health status assessment without affecting a person's daily activities [2]. The setup of novel smart environments, context-aware assistive devices, and activity monitoring systems provide great opportunities to improve quality of life, to increase independence in daily living, and to support a wide range of applications and services including mobile telemedicine [3], location-based medical services, emergency response and management, personalized healthcare [4], social support and pervasive access to healthcare information [5].