Dual architecture platform for unobtrusive wheelchair user monitoring

Publisher: IEEE

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Abstract:
This paper presents a wheelchair platform with sensing hardware for monitoring the cardiac activity of its user. A set of unobtrusive sensors was placed on the wheelchair, namely for acceleration, ballistocardiogram, contactless electrocardiogram, contactless impedance cardiogram, reflection photoplethysmogram, and seat temperature acquisition. The signals are fed to two coexisting architectures. One is based on a Digital Signal Processor to process the data, and compute physiological parameters, enabling the wheelchair to be fully autonomous, by implementing a Wi-Fi server allowing remote clients to control the tasks. The second architecture is based on a data acquisition board with Wi-Fi point to point communication, requiring a remote computer to process the signals and compute the vital parameters. This wireless acquisition board is used during the validation tests since new easy to implement algorithms were considered. This dual architecture enables different intended uses, from medical staff wanting the analysis of signals, to the wheelchair user family, which only demands information is case of emergency. Access to the most meaningful homeostasis parameters is given in two coexisting architectures, with flexible configurations, and power management options according with the intended use.

Published in: 2013 IEEE International Symposium on Medical Measurements and Applications (MeMeA)

Date of Conference: 4-5 May 2013 **INSPEC Accession Number:** 13628966

Date Added to IEEE *Xplore*: 01 July 2013 **DOI:** 10.1109/MeMeA.2013.6549720

ISBN Information:

Publisher: IEEE

Conference Location: Gatineau, QC, Canada

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I. Introduction

At home monitoring solutions are an economically viable solution, which also pleases the patients [1]–[3]. However, in order to create

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telemedicine services and devices with higher acceptance rate unobtrusive vital signs monitoring is a recommendable approach [4].

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