BIOSTEC 2012

5th International Joint Conference on Biomedical Engineering Systems and Technologies

Final Program and Book of Abstracts

Vilamoura, Algarve, Portugal
1 - 4 February, 2012

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As in previous editions of the Conference, based on the reviewers' evaluations and on the quality of presentations, a short list of authors will be selected and invited to submit extended revised versions of their papers for a book that will be published by Springer with the best papers of BIOSTEC 2012.
We would like to express our thanks to all participants. First of all, to the authors, whose quality work is the essence of this joint conference. Next, we thank all the members of the program committee and the auxiliary reviewers for their diligence and expert reviewing. We would also like to deeply thank the invited speakers for their excellent contribution in sharing their knowledge and vision. Fourthly, we thank the program chairs, Joaquim Gabriel, Jan Schier, Sabine Van Huffel and Emmanuel Conchon whose collaboration was much appreciated. Finally, special thanks to all the members of the INSTICC team whose collaboration was fundamental for the success of this conference.
We wish you all an inspiring conference and an unforgettable stay in Vilamoura, Algarve and we hope to meet you again next year for the 6th BIOSTEC, details of which will soon be available at http://www.biostec.org.

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Panel

Wednesday, 1
9:00 – 10:30
Room: Fénix I

Title: "*Saving Lives and Money: Biomedical Technology Economic Impact*"

Chair:

Hugo Gamboa

enablesWavelet-based HRV spectral analysis. Until now this package only supported HRV spectral analysis based on the Fourier transform.

Paper 44 BIOSTEC
10:20 - 10:45 Foyer
Poster Session 4

TOWARDS WEARABLE AND CONTINUOUS 12-LEAD ELECTROCARDIOGRAM MONITORING
Synthesis of the 12-lead Electrocardiogram using 3 Wireless Single-lead Sensors

C. P. Figueiredo and P. M. Mendes
University of Minho, Guimarães, Portugal

Keywords: Health Monitoring Devices, Biotelemetry, Wireless Systems, Wearable Systems, 12-lead ECG Synthesis, 12-lead ECG Reconstruction, Low-Power Design.

Abstract: Wearable health monitoring systems have emerged in the last decade as innovative means for patient observation and healthcare delivery. Among the physiological signals which can be measured using such systems, the 12-lead electrocardiogram is arguably the most important. However, continuous monitoring of the standard 12 lead electrocardiogram is impractical and unattractive for a wearable system, due to the obtrusiveness and discomfort that the placement and connection of 10 electrodes would cause. In this regard, the use of reduced lead sets for the synthesis of the 12-lead electrocardiogram is a preferable solution. This work analyses the suitability of a wireless sensor network prototype for continuous and simultaneous monitoring of a set of 3 modified electrocardiogram leads, which can be used for synthesis of the 12-lead electrocardiogram by application of a patient-specific transformation matrix, estimated by multiple linear regression.

Paper 47 BIOSTEC
10:20 - 10:45 Foyer
Poster Session 4

MINIATURIZED WIRELESS CONTROLLED ELECTROSTIMULATOR

Tiago Araújo[1,2], Neuza Nunes[2] and Hugo Gamboa[1]
[1] *Universidade Nova de Lisboa, Lisbon, Portugal*
[2] *PLUX - Wireless Biosignals, Lisbon, Portugal*

Keywords: Electrostimulation, Wireless, Portability, Hardware development, Closed loop.

Abstract: This project introduces a new approach to hardware and software controlled solutions in the electrical stimulation field. A miniaturized, portable and wireless electrostimulator was designed and its development steps and also a new perspective to control the stimulation parameters in real time are exposed in this paper. Our system allows the control and automation of the stimulation session with high flexibility and easiness, using a userfriendly interface for a computer or an Android platform, which communicates with the portable and wireless device. The hardware performance was tested with a skin electric model, achieving the expected results. The presented solutions have high applicability in the scientific and ambulatory electrostimulation context.

Paper 75 BIOSTEC
10:20 - 10:45 Foyer
Poster Session 4

FALL DETECTION SYSTEM FOR ELDERLY PEOPLE
A Neural Network Approach

Getúlio Igrejas[1], Joana S. Amaral[1,2] and Pedro J. Rodrigues[3]
[1] *Polytechnic Institute of Bragança, Bragança, Portugal*
[2] *REQUIMTE, Pharmacy Faculty, University of Porto, Porto, Portugal*
[3] *Polytechnic Institute of Bragança, Braganca, Portugal*

Keywords: Fall Detection, Neural Network, Inertial Sensors, Features Selection, Embedded Devices.

Abstract: In this work a new approach for a fall detection system is proposed. The device integrates a 3-axis accelerometer and a 3-axis gyroscope to measure linear acceleration and angular velocities, respectively. Information from both sensors is used to characterize movements through selected features extracted from raw data. A classification system based on a Feedforward Backpropagation Neural Network is then trained, based on the extracted features. The performed tests present low false positives and low false negatives rates with good specificity and sensitivity values.