

Accepted Manuscript

Performance comparison between wrist and chest actigraphy in combination with heart rate variability for sleep classification

Md Aktaruzzaman, Massimo Walter Rivolta, Ruby Karmacharya, Nello Scarabottolo, Luigi Pugnetti, Massimo Garegnani, Gabriele Bovi, Maurizio Ferrarin, Roberto Sassi



PII: S0010-4825(17)30259-7

DOI: [10.1016/j.combiomed.2017.08.006](https://doi.org/10.1016/j.combiomed.2017.08.006)

Reference: CBM 2746

To appear in: *Computers in Biology and Medicine*

Received Date: 23 February 2017

Revised Date: 3 August 2017

Accepted Date: 3 August 2017

Please cite this article as: M. Aktaruzzaman, M.W. Rivolta, R. Karmacharya, N. Scarabottolo, L. Pugnetti, M. Garegnani, G. Bovi, M. Ferrarin, R. Sassi, Performance comparison between wrist and chest actigraphy in combination with heart rate variability for sleep classification, *Computers in Biology and Medicine* (2017), doi: 10.1016/j.combiomed.2017.08.006.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Performance comparison between wrist and chest actigraphy in combination with heart rate variability for sleep classification

Md Aktaruzzaman^{a,b,*}, Massimo Walter Rivolta^a, Ruby Karmacharya^a, Nello Scarabottolo^a, Luigi Pugnetti^c, Massimo Garegnani^c, Gabriele Bovi^c, Maurizio Ferrarin^c, Roberto Sassi^a

^a*Dipartimento di Informatica, Università degli Studi di Milano, Milan, Italy*

^b*Department of Computer Science and Engineering, Islamic University, Kushtia, Bangladesh*

^c*IRCCS S. Maria Nascente, Fond. Don Carlo Gnocchi Onlus, Milan, Italy*

Abstract

The concurrent usage of actigraphy and heart rate variability (HRV) for sleep efficiency quantification is still matter of investigation. This study compared chest (CACT) and wrist (WACT) actigraphy (actigraphs positioned on chest and wrist, respectively) in combination with HRV for automatic sleep vs wake classification. Accelerometer and ECG signals were collected during polysomnographic studies (PSGs) including 18 individuals (25 to 53 years old) with no previous history of sleep disorders. Then, an experienced neurologist performed sleep staging on PSG data. Eleven features from HRV and accelerometry were extracted from series of different lengths. A support vector machine (SVM) was used to automatically distinguish sleep and wake. We found 7 minutes as the optimal signal length for classification, while maximizing specificity (wake detection). CACT and WACT provided similar accuracies (78% chest vs 77% wrist), larger than what yielded by HRV alone (66%). The addition of HRV to CACT reduced slightly the accuracy, while improving specificity (from 33%

*Corresponding author: Md Aktaruzzaman while performing this study was with the Dipartimento di Informatica, Università degli Studi di Milano, Italy. He is now with the Department of Computer Science and Engineering, Islamic University, Kushtia 7003, Bangladesh. Phone: +880 71 62201 (ext 2313).

Email address: md.aktaruzzaman@cse.iu.ac.bd (Md Aktaruzzaman)

Download English Version:

<https://daneshyari.com/en/article/4964882>

Download Persian Version:

<https://daneshyari.com/article/4964882>

[Daneshyari.com](https://daneshyari.com)