

Abstract Preview - Step 3/4

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Topic: B. Clinical Sleep Science - 27. Instrumentation and Methodology

Track: Track 4: Sleep mechanisms and functions

Title: Sleep-wake detection using bed movement sensor

Author(s): [J. Virkkala](#)¹, [H. Mikola](#)², [K. Müller](#)^{3,4}, [M. Härmä](#)⁴

Institute(s): ¹Sleep Laboratory, Finnish Institute of Occupational Health, Helsinki, ²Hospital District of Southwest Finland, Turku, ³Current: Nokia Technologies Laboratories, Espoo, ⁴Finnish Institute of Occupational Health, Helsinki, Finland

Text: **Objectives:** Long term sleep monitoring using unobtrusive bed movement sensors seems promising. Usually sleep-wake detection is based on detected movements, respiration, and heart rate. Type of bed, placement of sensor can disturb the quality of respiration and heart rate signal. There are also various medications, medical conditions which affect respiration and especially heart rate. These reasons could limit practical applicability of respiration and heart rate based sleep-wake detection. In this study we studied how the use of only movement information of bed sensor could be used for sleep-wake detection possibly making bed movement systems less susceptible for mentioned factors.

Methods: Subset of 167 subjects of previous study (Virkkala et al., Automatic sleep stage classification using two-channel electro-oculography, J Neurosci Methods. 2007) were analyzed for previously unpublished static charge sensitive bed (SCSB) signal. Maximum absolute value of raw 200 Hz SCSB was calculated for each second. Number of seconds above threshold was then calculated for each visually scored sleep-wake epochs. Leave-one-out cross-validation (LOOCV) was used to determine these two parameters for maximal Cohen's Kappa.

Results: Due to poor SCSB signal 7 subjects were excluded. Average sleep efficiency for remaining 160 subjects was 84%. Epoch by epoch agreement and Cohen's Kappa for sleep-wake detection using bed movement sensor were 85% and 0.34.

Conclusions: Using only movement signal of bed sensor resulted in reasonable accuracy of sleep-wake detection. In addition to various bed sensors same detection algorithm could be applied to other e.g. doppler or depth video based sensors capturing body movements.

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