Sleep Analysis Library

Key features

- Output data for momentary and cumulative whole night applications
  - Overnight Recovery Analysis utilizing detected high and low frequency heart rate variability, respiration depth and respiration variability.
  - Automated Wakefulness, REM, Shallow and Deep Sleep scoring
  - Supports sleep quality index based on detected recovery, REM-, deep and total sleep times.
- Currently supported operating systems
  - Ubuntu 18.04 and newer
  - CentOS 6.0 and 7.0

SW functionality

- BCG-based sleep analysis
  - Non-intrusive and user-friendly measurements enabled by Murata SCA10H/11H BCG bed sensor.
  - Measures the pumping activity of the heart influenced by the autonomous nervous system and the mechanical effect of respiration to detect sleep stages and the stress and recovery balance.
  - Detection performance is enhanced by motion artefact and arrhythmia removal processing

Evaluation tool

- Standalone PC-application with graphical user interface to post-process 1 Hz BCG-data
- Full algorithm, output restricted to cumulative results

Detection characteristics*

<table>
<thead>
<tr>
<th>Sleep phase</th>
<th>Detection sensitivity</th>
<th>Total sleep</th>
<th>REM sleep</th>
<th>Deep sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&gt; 90 %</td>
<td>&gt; 60 %</td>
<td>&gt; 60 %</td>
<td></td>
</tr>
</tbody>
</table>

PSG vs BCG correlation

- **Beat detection**: ± 45 min
- **PSG vs BCG**: ± 45 min

Further in-depth information can be found in APP 2810 BCG-Based Sleep Analysis SW ENG (ID 75286), available on request.

Input BCG data

```
23.55,15.84,47.2001,1,1063,0,0
24.55,17.82,24,2050,1,1089,0,0
25.55,17.85,19,2108,1,1059,0,0
```

Output data

- Cumulative vector once/run 0.342 0.325 0.048 0.078 0.199 0.016 0.139 2.589 29.192
- Output matrix at 1 Hz 1.12 1.03 66.88 10.07 5.12 4.66 0
  1.12 1.03 66.88 10.07 5.12 4.66 0

* Clinical study at Turku University Sleep Research Centre and home test with ambulatory PSG by Finnish Institute of Occupational Health, Statistics of 45 overnight tests, age 24 – 65 years, 30 male, 15 female

** Average reference value ± min/max deviation

*** 95% estimate

Please contact local Murata sales for further information.

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