Deriving Respiration from the Pulse Photoplethysmographic Signal

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A method for respiratory signal estimation from the pulse photoplethysmographic (PPG) signal is presented. The method is based on combination of three parameters present in this signal: pulse rate variability, pulse amplitude variability and pulse width variability.

Evaluation is performed over a database containing electrocardiographic (ECG), PPG and respiratory signals simultaneously recorded in 17 subjects during a tilt table test, obtaining a respiratory rate estimation error of $0.33 \pm 8.39\%$ (1.45 ± 16.44 mHz). These results are comparable or outperform those obtained from other methods which involve the ECG, so it is possible to have reliable respiration estimates from just the PPG.