"A Hierarchical Method for Removal of Baseline Drift form Biomedical Signals"

VCU # 12-090

Applications

- Removing noise from ECG
- Adapted form would remove noise from other signals, physiological or not

Advantages

- Customized adaptive notch filtering with superior performance
- Combination of adaptive filters and BSS provides effective noise removal with limited trade-offs

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Market Need

An Electrocardiogram (ECG) is an important diagnostic tool used to detect the activity of the heart. Parts of these signals can be obscured by baseline wander, which is noise cause by movement, breathing, or electrode impedance. It is important for this noise to be removed in order for clinicians to receive complete, uncorrupted information. Current methods involve using certain filters that are limited by frequency delineation or reference choice.

Technology Summary

Independent Component Analysis (ICA) is used to make an estimation of the true baseline wander. This technology removes ECG baseline wander by combining adaptive notch filters with Blind Source Separation (BSS). This allows for the customization of ICA and a more complete removal of baseline wander than previous methods. Furthermore, the factors affecting the performance of the separation process are explored and improved in this invention. The following figure shows a signal comparison between the proposed method and a frequently used method, robust locally weighted regression. Significant error differences can be demonstrated. The invented methodology can be applied to remove noise from any other signal.
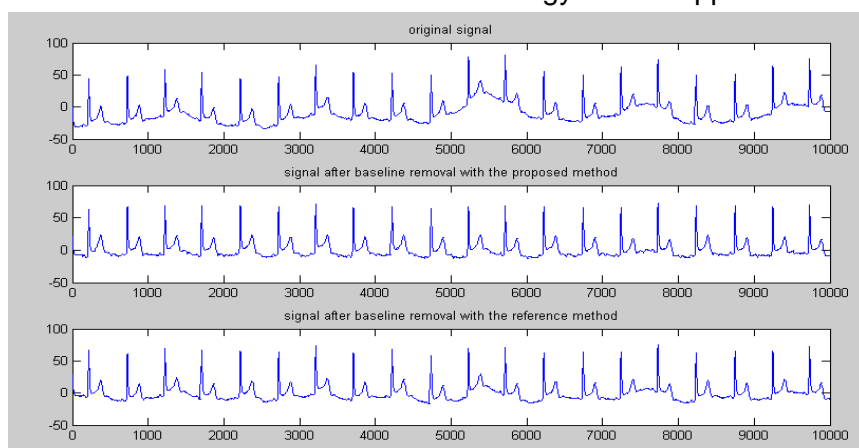
Original Signal

Signal after proposed method

Reference Signal

Technology Status

Patent pending: U.S. and foreign rights are available.

This technology is available for licensing to industry for further development and commercialization.