Optimized filtering technique enhances electromyogram signal quality for upper limb prostheses control

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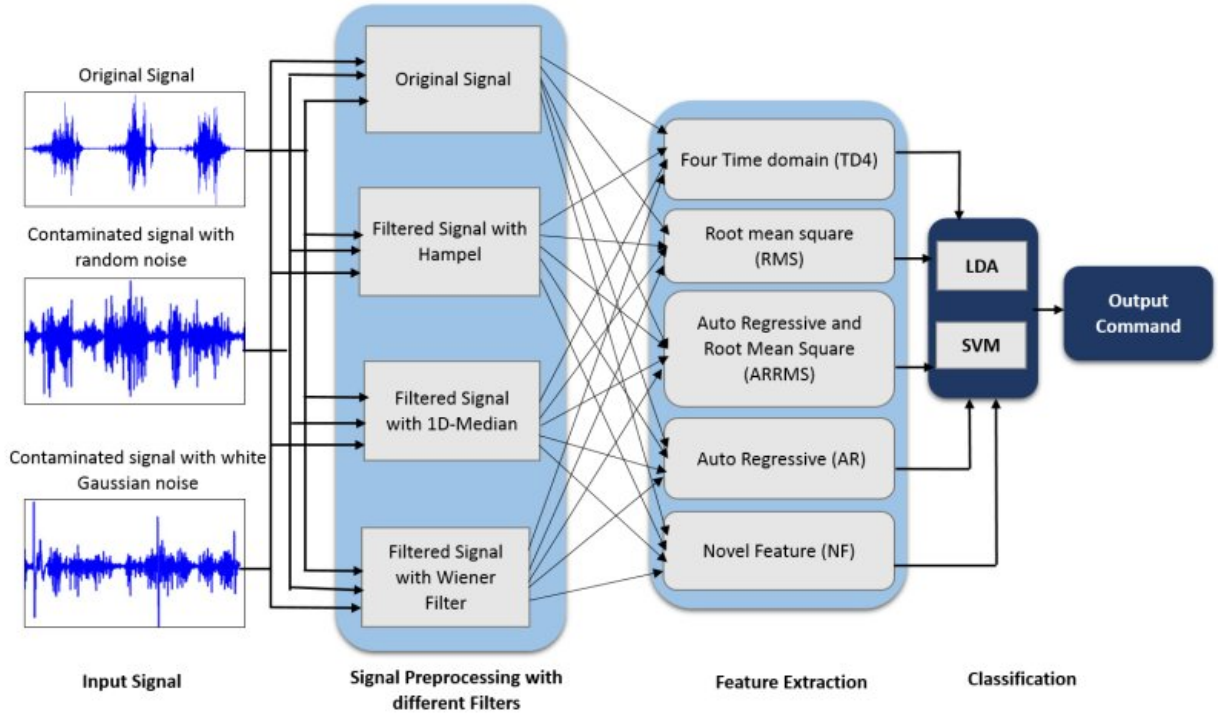

The schematic diagram of the reported method. Credit: SIAT

Myoelectric pattern recognition (PR)–based strategies have been applied to control upper limb prostheses. However, transhumeral amputees often lack the requisite residual muscles to produce high-quality

electromyogram (EMG) signals that are essential for intuitively controlling their prosthetic device.

A research group led by Prof. Chen Shixiong and Assoc. Prof. Oluwarotimi Williams Samuel from the Shenzhen Institute of Advanced Technology (SIAT) of the Chinese Academy of Sciences has proposed an optimized technique based on Wiener filter to enhance high-density surface EMG signals.

This technique could realize precise motion intent decoding in the context of upper limb prostheses control. The study was published in *Biomedical Signal Processing and Control* on Jan. 18.

The researchers explored the capability of different filtering techniques (including Hampel, 1-Dimensional Median filter and the proposed Wiener filter) in denoising transhusmeral amputees' EMG signals to yield adequate PR-based control for prosthetic devices.

They also compared the performances of the filtering techniques by using myoelectric signals obtained from transhumeral amputees. Experimental results with statistical testing showed that the proposed Wiener filter led to best EMG signal quality, thus resulting in consistently highest decoding performance for the amputees' limb movement intent.

More information: Yazan Ali Jarrah et al, High-density surface EMG signal quality enhancement via optimized filtering technique for amputees' motion intent characterization towards intuitive prostheses control, *Biomedical Signal Processing and Control* (2022). DOI: 10.1016/j.bspc.2022.103497