

## **Combination of Surface EMG Signal Feature for Gait Phase Detection**

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Surface electromyography (sEMG) signal is widely used in many studies as the intelligent prosthetic control input. It inflects direct user's movement and gait phase [1, 2] which is essential for an automatic prosthetic damper adjustment. While using the raw sEMG signal is difficult for classifying subject movements or activities, various type of domains extracted from raw signal such as time domain, frequency domain and time-scale domain are introduced to make the sEMG pattern classification more reliable [3, 4]. Nevertheless, information extracted from only one domain feature is limited [5]. In this study, we present the combinations of multiple domain feature set for improving gait phase recognition performance which will be used in the variable damper above-knee prostheses [6]. The combination between a time domain feature and a frequency domain feature for finding the most effective set is included.

Accuracy is used to show the performance, e.g. the best feature set shall give the highest accuracy. Table 1 to 4 display accuracies in percent of gait phase detection for each feature. The average values of accuracy in the time domain features, frequency domain and in the combination between time domain and frequency domain are 90.372% , 87.41% and 93.77%, respectively. The result emphasizes that the combination between two domains feature give higher detection accuracy. Combination of wAmp and MNF give detection accuracy higher than single time domain features. As shown in the result, the combinations between time domain feature and frequency domain feature improve the accuracy of gait phase classification and the best combination feature set is the feature between wAmp and MNF which shall be applied in the variable damper above-knee prostheses.