

Mutual Adaptation among Human and Machines (Prof. H. Yokoi and Prof. T. Arai)

Surface electromyogram (EMG) is an electrical action potential of muscle detected on the skin surface and it can be recorded by a non-invasive electric measurement. EMG is a bio-signal which includes the information of the motion dynamics, so it is used to estimate the motion intention of an amputee for controls of the prosthetic hand. However, there are several problems on using EMG. : High nonlinearity, individual variation and non-stationary. In order to solve these problems, we have proposed a control method for multi-D.O.F prosthetic hand using adaptive learning as information processing. These methods succeeded to recognize many hand motion patterns. In the field of this study, we aim to clarify the aspect of mutual adaptation among human and machines by investigating adaptive human action.

Multi-D.O.F. Hand and Adaptable Control for Individual Characteristics: An input for controlled multi-D.O.F. hand is also a mechanomyogram, muscle tension and so on. Using concept of machine learning, the method for acquiring mapping between EMG and hands motion pattern is effective. We called this method “Adaptable control for individual characteristics” (Fig.1) and have developed. In the present research, by using the self organization clustering way of thinking, we analyze the human adaptation process. We propose an adaptive learning method to maintain the fingers movement identification performance when using EMG signal dynamical patterns.

Keywords: EMG, Adaptable Control for Individual Characteristics

References

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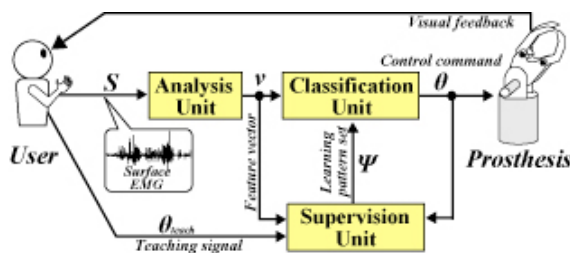


Fig. 1 EMG classification method.

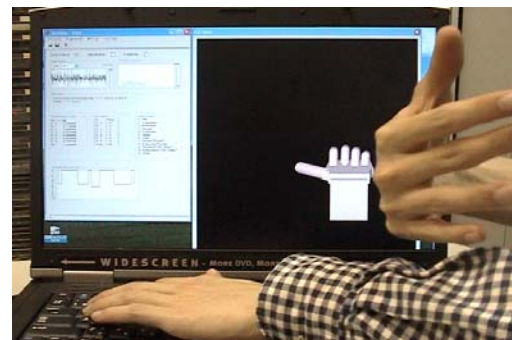


Fig. 2 Inputting instruction signals from the keyboard.