HUMAN BEHAVIOUR RECOGNITION, IDENTIFICATION, AND COMPUTER INTERACTION

Edited by

Othman Omran Khalifa, B.Sc. ,M.Sc., Ph.D.,
International Islamic University Malaysia

Shihab A. Hameed, B.Sc., M.Sc., Ph.D.,
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EMG Signal Classification Techniques for The Development Of Human Computer Interaction System

Md. Rezwanul Ahsan, Muhammad Ibn Ibrahimyand Othman Omran Khalifa
Electrical and Computer Engineering, Kulliyyah of Engineering
International Islamic University Malaysia
Kuala Lumpur 53100, Malaysia

25.1. INTRODUCTION

With the rapid development of information technology, the quantity of information sharing by human is increasing accordingly. Since early eighty, numbers of researchers are engaged to develop alternative interfaces for elder and disabled people. More recently, the advancement of technology attracting the researcher attention with respect to extracting user's intention data from neural signals. These types of signals can provide information related to body or limb motion faster than other means. On the basis of central nervous system and peripheral nervous system, various types of techniques have been developed to execute user's intention. The brain signals from central nervous system have the potential for revealing human thoughts. The EEG is a noninvasive monitoring method of recording and analyzing brain activities on the scalp [1]. However, the acquired signals not only represent the massed activities of many cortical neurons but also provide a low spatial resolution and a low signal-to-noise ratio (SNR). Afterwards, there are many technical difficulties need to be solved, and extensive training is usually required for interface methods based on brain activities [2]. At the level of the peripheral nervous system, the signals due to body motion can be detected and acquired by an ENG [3] and an EMG [4]. However, ENG signal based interfaces have limitations with respect to the SNR, dimensions, and drifts. Due to the damage in neural tissue and differential motion of the electrode within the fascicle causes a reduction in the SNR and a gradual drift in the recorded nerve fiber population. On the other side, EMG signal can be measured more conveniently and safely than other bio-signals. EMG signal can be easily generated by voluntary muscle movement and it has better properties of SNR and high amplitude. Hence, an EMG-based HCI is most practical with current technologies.

The idea behind EMG signal controlled HCI is to efficiently convert the amputee's intention in the form of EMG signals into corresponding computer commands. The heart of this conversion is signal classifier. Upon the contraction of muscle, properly positioned surface