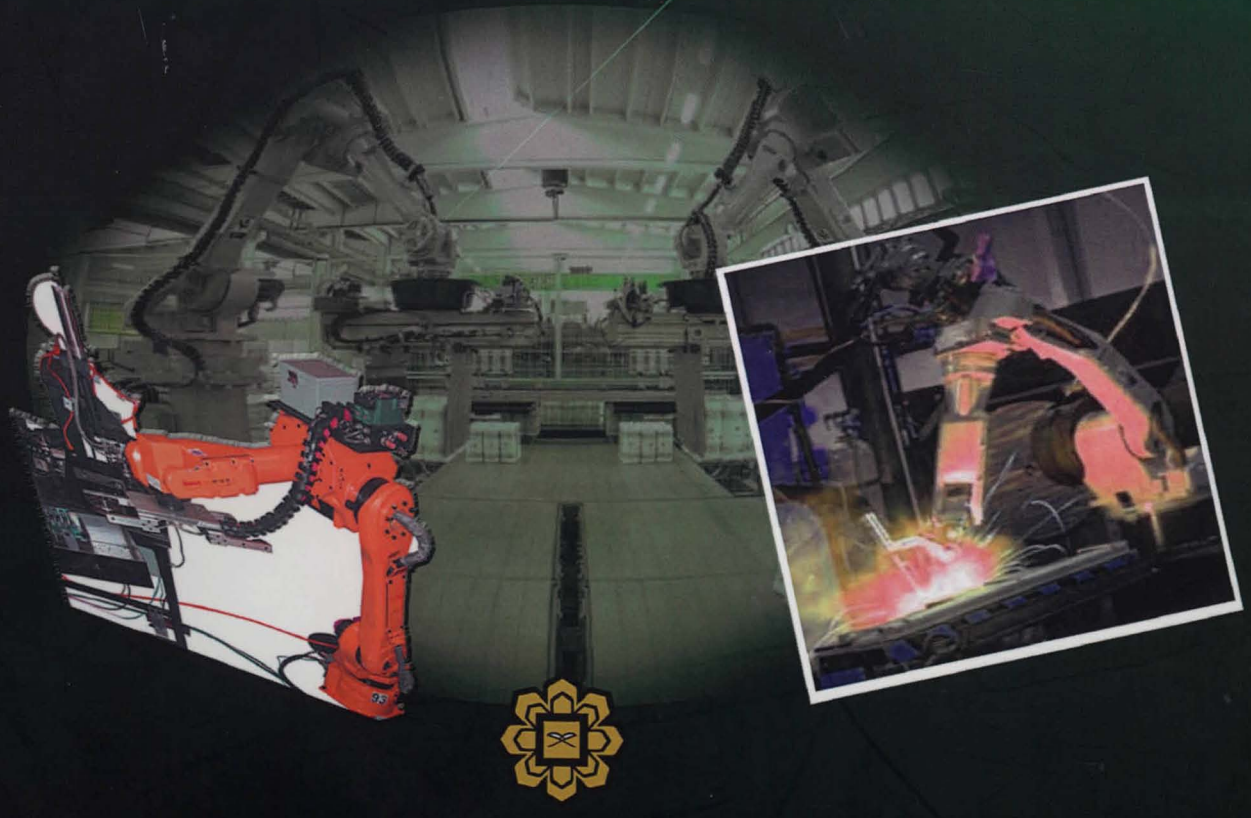
MECHATRONICS BOOK SERIES

ROBOTICS AND AUTOMATION

Rini Akmeliawati
Wahju Sediono
Nahrul Khair Alang Md. Rashid



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MECHATRONICS BOOK SERIES: ROBOTICS AND AUTOMATION

Editors

Rini Akmeliawati
Wahju Sediono
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CHAPTER 26

Development of Robotic Manipulator to Assist Human Using Brain Signal

Mahbuba Hossain[2,a], Raisuddin Khan[1, b] and Masum Billah[3,c]

[1,2,3]Department of Mechatronics Engineering, Kulliyyah of Engineering, International Islamic University Malaysia, Malaysia

[a]mahbuba@yahoo.com, [b]raisuddin@iium.edu.my, [c]masum.uia@gmail.com

26.1 Introduction

Researchers at the Fraunhofer Institute for Computer Architecture and Software Technology FIRST and the Charité hospital in Berlin have been working on this type of interface for almost seven years. The development team presented their robot arm at Medica 2007 in Düsseldorf from November 14 to 17 (Hall 3, Stand F92) [1]. We must be wondering how can thoughts be translated into instructions for the robot? The solution is based on a concept known as a brain-computer interface (BCI) [2]. For the input, the researchers used a perfectly normal electroencephalogram (EEG), just like the ones used in everyday clinical practice [3]. Electrodes attached to the patient's scalp measure the brain's electrical signals, which are amplified and transmitted to a computer. Highly efficient algorithms analyze these signals using a self-learning technique. The software is capable of detecting changes in brain activity that take place even before a movement is carried out [4]. It can recognize and distinguish between the patterns of signals that correspond to an intention to raise the left or right hand, and extract them from the pulses being fired by millions of other neurons in the brain. These neural signal patterns are then converted into control instructions for the computer. "The advantage of this technology is that it is capable of translating an intended action directly into instructions for the computer," says team leader Florin Popescu. The Brain2Robot project has been granted around 1.3 million euros in research funding under the EU's sixth Framework Programme (FP6). Its focus lies on developing medical applications, in particular control systems for prosthetics, personal robots and wheelchairs. The researchers have also developed a "thought-controlled typewriter", a communication device that enables severely paralyzed patients to pick out letters of the alphabet and write texts. The robot arm could be ready for commercialization in just a few years' time [5]. The Objectives are to the classification of brain signal for reaching objects and perform experiments to validate classification of brain signals.