

# MECHATRONICS BOOK SERIES

## ROBOTICS AND AUTOMATION

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Rini Akmeliawati  
Wahju Sediono  
Nahrul Khair Alang Md. Rashid



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

# **MECHATRONICS BOOK SERIES: ROBOTICS AND AUTOMATION**

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## **Editors**

Rini Akmeliawati  
Wahju Sediono  
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**IIUM Press**

Published by:  
IIUM Press  
International Islamic University Malaysia

First Edition, 2011  
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Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

Rini Akmecliawati, Wahyu Sediono & Nahrul Khair Alang Md. Rashid:  
Mechatronics Book Series Robotics and Automation

ISBN: 978-967-418-152-9

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM  
(Malaysian Scholarly Publishing Council)

Printed by :  
**IIUM PRINTING SDN.BHD.**  
No. 1, Jalan Industri Batu Caves 1/3  
Taman Perindustrian Batu Caves  
Batu Caves Centre Point  
68100 Batu Caves  
Selangor Darul Ehsan  
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543  
EMAIL: [iiumprinting@yahoo.com](mailto:iiumprinting@yahoo.com)

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## CHAPTER 2

# Robot Design: A Case Study of Team Learning Experience and Outcome

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### 2.1 Introduction

The field of technology education world-wide is undergoing intensive curricular revision to accommodate the contents and practices to meet the requirement of modern technological operations. One of the items that are look into is the project component in engineering the engineering syllabus that is undertaken during the final stage in engineering student education. Many technological educators characterized the project as a model for integrating vocational and academic education. As the consequence, hands-on experience in vocational workshop, problem solving, research and presenting findings need to be include in the project.

The project-oriented education leads to constructivist theory of learning as a counterpart to behavioristic pedagogy [Von Glasersfeld, 1996]. In this approach, the knowledge is assumed not to be passively received neither by sensing not by communicating; instead, it is actively built up by the cognitive subject. Therefore, it can be assumed that active engagement to particular processes of designing and experiencing with external artifact can develop knowledge and model of the world in the learner's mind through.

The amount of student participation in the robotic design process is also important factor in the constructivist theory of learning and outlined by MIT's Epistemology Learning Group [Kafai and Resnick, 1996] [Papert , 1993]. Students are required to design robots and software in the project instead of merely assembling or simulating a machine designed by someone else. During the design process students develop their model of the artifacts and physics in their mind.

When fully explored a robotic based project requires a broad variation of skills from basic mechanical design, electronics, programming and artificial intelligence. In many cases, attempting to incorporate all of these areas is often beyond the capability of students and imposes a major burden to lecturers. Therefore, instead, projects should be designed to focus only on specific aspects of overall design with emphasis on integrating such knowledge with other skills by gradually expanding the necessary skills of students.

Competition is a series of experimentation and students are exposed to unexpected and unanticipated situations. Through competitions, students are expected to learn how to anticipate and cope with the unexpected situations. Furthermore, students will be naturally motivated and learn to analyze design of opponents. The analysis can be used to reflect on to improve their own design. The skills fostered in this case are analysis skill, and skills to apply the acquired knowledge to existing artifacts.

The advantages of competitions are students are extremely motivated to work on the project and the team goal can be visualized in each student mind. This is due to the nature of competition