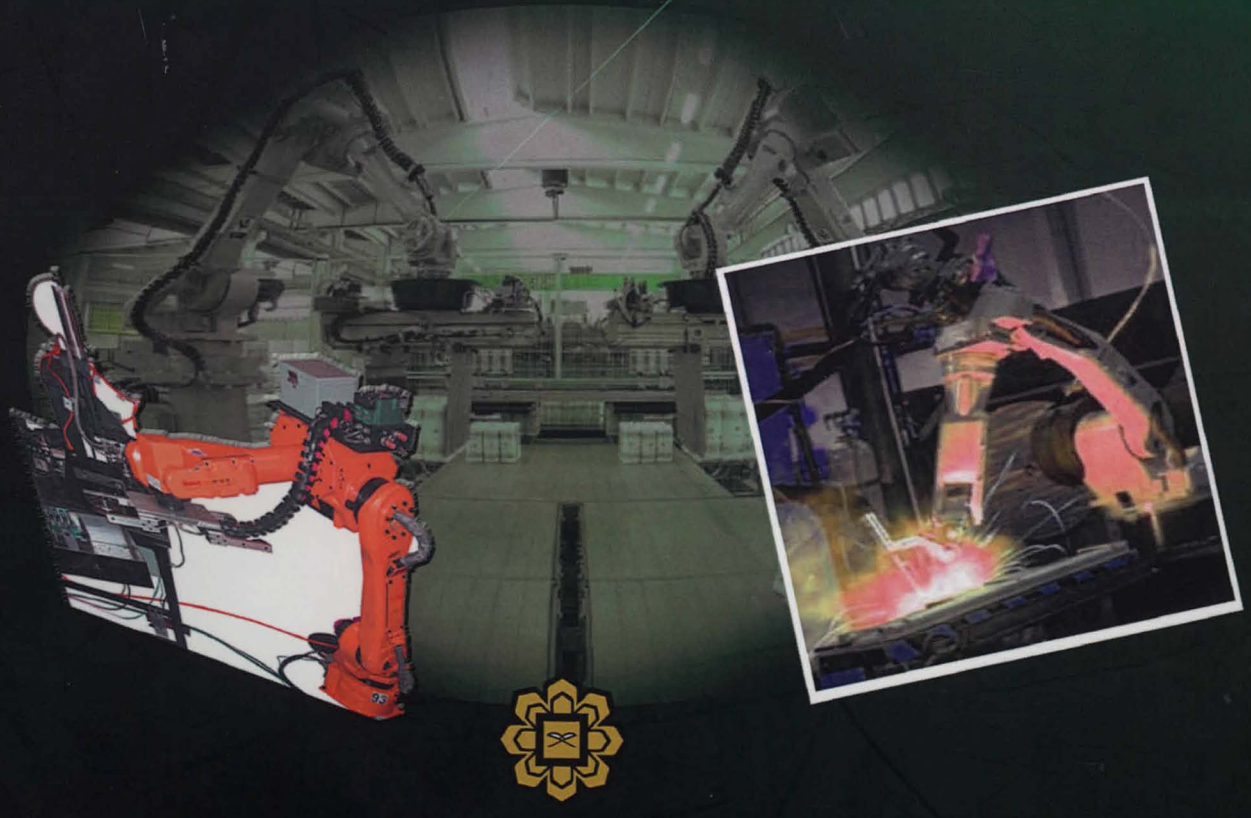
MECHATRONICS BOOK SERIES

ROBOTICS AND AUTOMATION

Rini Akmeliawati
Wahju Sediono
Nahrul Khair Alang Md. Rashid



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

MECHATRONICS BOOK SERIES: ROBOTICS AND AUTOMATION

Editors

Rini Akmeliawati
Wahju Sediono
Nahrul Khair Alang Md. Rashid

IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Rini Akmeliawati, Wahju 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

TABLE OF CONTENTS

CHAPTER 19

Develop an Algorithm for Goal Finding Robot using Reinforcement Learning

MAS Kamal[1], Raisuddin Khan[2, a], Saeed Bazuhair[3,b] and Masum Billah[4,c]

[1,2,3,4]Department of Mechatronics Engineering, Kulliyyah of Engineering, International Islamic University Malaysia, Malaysia

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

19.1 Introduction

Autonomous robots are robots which can perform desired tasks in unstructured environments without continuous human guidance or intervention. All kinds of robots have some degree of autonomy. Different robots can be autonomous in different ways or from different angle point of view. In other word, Autonomy is the other way of describing the level of intelligence any machine has. A fully autonomous robot should have the ability to perform some basic tasks such as gaining information about the environment, work for an extended period without human intervention, mobility to move either all or part of itself throughout its operating environment, without human assistance, and avoid situations that are harmful to people, property, or itself. Machine learning refers to a system capable of the autonomous acquisition and integration of knowledge [1-3]. This capacity to learn from experience, analytical observation, and other means, results in a system that can continuously self-improve and thereby offer increased efficiency and effectiveness.

Machine learning is a wide subfield of artificial intelligence which concerned with the design and development of algorithms and techniques that allow computers to *"learn"*. At a general level, there are two types of learning: inductive, and deductive [4].

The major focus of machine learning research is to extract information from data automatically, by computational and statistical methods [5-7]. Hence, machine learning is closely related not only to data mining and statistics, but also theoretical computer science.
Human intuition cannot be entirely eliminated since the designer of the system must specify how the data is to be represented and what mechanisms will be used to search for a characterization of the data. Machine learning can be viewed as an attempt to automate parts of the scientific method [8-9].

Finally learning robots are the robots, that learn from their external surroundings for changing/modifying their operating system or just simply updating them through a memory or other means.

19.2 Reinforcement Learning

Reinforcement learning is the knowledge acquired due to several experiences, called Experience based design in the Behavioral Science, with element of reward or punishment to indicate the desirability of the resulting state. It is a branch of Machine Learning. Through Reinforcement Learning the task of the agent/robot is to learn how to obtain the optimal solution/action for any given learning problem for better end results. RL considered as the