

# 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  
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

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

# TABLE OF CONTENTS

---

<b>Preface</b>	<b>i</b>
<b>Acknowledgement</b>	<b>ii</b>
<b>Editor</b>	<b>iii</b>
<b>Table of Content</b>	<b>v</b>
<b>1. Visual Tracking for Human Face</b> A.A. Shafie, Iqbal and M.R. Khan	<b>1</b>
<b>2. Robot Design : A Case Study of Team Learning Experience and Outcome</b> A.A. Shafie	<b>7</b>
<b>3. Development Neck Support for Humanoid Robot Head</b> A. A. Shafie, M.N. Kasyfi and N. I. Taufik Y	<b>14</b>
<b>4. Development of Cooperative Mini Robot</b> Amir A. Shafie , Siti E.M.Z and Shazeela A	<b>21</b>
<b>5. Humanoid Robot Arm</b> Amir A. Shafie and Mohd N. Y.	<b>26</b>
<b>6. Designing Human Robot Interaction for Emotionally Expressive Robotic Hear AMIR-III</b> A. Iqbal, A. A. Shafie, and M. R. Khan	<b>32</b>
<b>7. An Overview of Fuzzy Based Person Following Robot</b> T. Alamgir, I. J. Alfar and M. M. Rashid	<b>38</b>
<b>8. Mechanical Design of a Person Following Robot</b> Tarik Bin Alamgir, Ibrahim Jawad Alfar and Muhammad Mahbubur Rashid	<b>43</b>

<b>9. Development of Fuzzy Based Person Following Robot part 2</b>	<b>49</b>
Tarik Bin Alamgir, Ibrahim Jawad Alfar and Muhammad Mahbubur Rashid	
<b>10. Mobile Robot for Fined Tube Inspection</b>	<b>56</b>
Muhammad Mahbubur Rashid	
<b>11. Robot Aided Upper Limb Rehabilitation System: Mechanical Design</b>	<b>64</b>
Shahrul Na'im Sidek, Hidayatullah Mohamed Nawi	
<b>12. Robot Aided Upper Limb Rehabilitation System: Electronics for Sensors and Actuators</b>	<b>69</b>
Shahrul Na'im Sidek, Khairul Anwar Khalid	
<b>13. Robot Aided Upper Limb Rehabilitation System: Results and Analysis</b>	<b>73</b>
Shahrul Na'im Sidek	
<b>14. Snake Robot Locomation in Narrow Space: A Review</b>	<b>79</b>
Raisuddin Khan, Mitsuru Watanabe and Masum Billah	
<b>15. Multiple Hexapod Robot and Collaborative communication</b>	<b>86</b>
Raisuddin Khan, Masum Billah and Mohiuddin Ahmed	
<b>16. Autonomous Unicycle Robot Using Reaction Wheel Pendulum: Mechanical Design</b>	<b>94</b>
Atika Adrina Teepol, Nur Fadhilah Mohd Fauzey, Shahrul Na'im Sidek, Yasir Mohd Mustafah	
<b>17. Autonomous Unicycle Robot Using Reaction Wheel Pendulum: Controller Design</b>	<b>103</b>
Nur Fadhilah Mohd Fauzey, Atika Adrina Teepol, Shahrul Na'im Sidek, Yasir Mohd Mustafah	

HISTORICAL BACKGROUND AND EDUCATION

<b>19. Develop an Algorithm for Goal Finding Robot using Reinforcement Learning</b>	<b>118</b>
M. Kamal, R. Khan, S. Bazuhair and M. Billah	
<b>20. Design and Development of 2 Fingers Robotic Hand Actuated by Active Grasping Data</b>	<b>126</b>
MdMozasser Rahman <sup>1</sup> ,MohdZoolfadli B MdSalleh	
<b>21. Design and Development of Interactive Fish Robot</b>	<b>144</b>
MdMozasser Rahman <sup>1</sup> ,RizaMuhida and Mohammad Zukhair b MohdNazmi	
<b>22. Design and Development of A Digger Robot</b>	<b>154</b>
MdMozasser Rahman,MohdRuzaini Bin AbdRalim and Others	
<b>23. Glass Wall Cleaning Robot: A Review</b>	<b>170</b>
Md Mozasser Rahman, Ahmed Murgab Mohammed Mahil, Norsofiana Bt Umar and Nurul Izzati Bt Samsuddin	
<b>24. Glass Wall Cleaning Robot: -Electrical design and control</b>	<b>177</b>
Md Mozasser Rahman, Ahmed Murgab Mohammed Mahil, Norsofiana Bt Umar and Nurul Izzati Bt Samsuddin	
<b>25. Glass Wall Cleaning Robot: -Electrical design and control</b>	<b>187</b>
M. M. Rahman, M. R. b A. Ralim	
<b>26. Development of Robotic Manipulator to assist human using brain Signal</b>	<b>198</b>
Mahbuba Hossain, Raisuddin Khan, and Masum Billah	
<b>27. Glass Wall Cleaning Robot: Mechanical Design</b>	<b>204</b>
Mahbuba Hossain Raisuddin Khan, and Masum Billah	

<b>28. Intelligent SCADA Based Monitoring Scheme for Low Voltage Distribution System</b>	<b>210</b>
M. J. E. Salami, A. M. Aibinua, Mohd Shafie Bin Sani and Nurfaizal Bin Wah	
<b>29. Intelligent SCADA Based Monitoring Scheme for Low Voltage Distribution System</b>	<b>218</b>
Abdullateef Ayodele Isqeel and Momoh Jimoh Eyiomika Salami.	
<b>30. Autonomous Goal Finding Robot</b>	<b>227</b>
M. Kamal, Md. R. Khan, Faisal and M. Billah	
<b>31. Intelligent SCADA Based Pipe Monitoring System</b>	<b>236</b>
M. J. E. Salami, A. M. Aibinua, Mohd Shafie Bin Sani and Nurfaizal Bin Wah	
<b>32. Path Tracking of Car Like Mobile Robot</b>	<b>250</b>
A. A. Isqeela and M. J. E. Salami	
<b>33. A New Energy Efficient Building System</b>	<b>255</b>
M. J. E. Salami, Md. R. Khan, O. A. Abdulquadric	
<b>34. Automatic Car Parking System</b>	<b>262</b>
M. J. E. Salami, Md. R. Khan and O. A. Abdulquadria	
<b>35. Anthropomorphic biped robot</b>	<b>267</b>
A. A. Shafie, M. F. Baharudin	

## CHAPTER 29

# Intelligent SCADA Based Monitoring Scheme for Low Voltage Distribution System

Abdullateef Ayodele Isqeel<sup>a</sup> and Momoh Jimoh Eyiomika Salami

Department of Mechatronics, Faculty of Engineering, IIUM

<sup>a</sup>abumukhtar2000@yahoo.com

### 29.1. Introduction

The demands for electricity for industrial and domestic purposes have increased rapidly since the middle of the last century because of industrial developments and expansion in population growth (Figure 1.1). Consequently, power utilities in various countries have attempted to bridge the gap between the demand and supply of electric power to the consumers. Most of these power utilities have shown concern for these challenges particularly the increase in power generation and optimization of distribution networks.

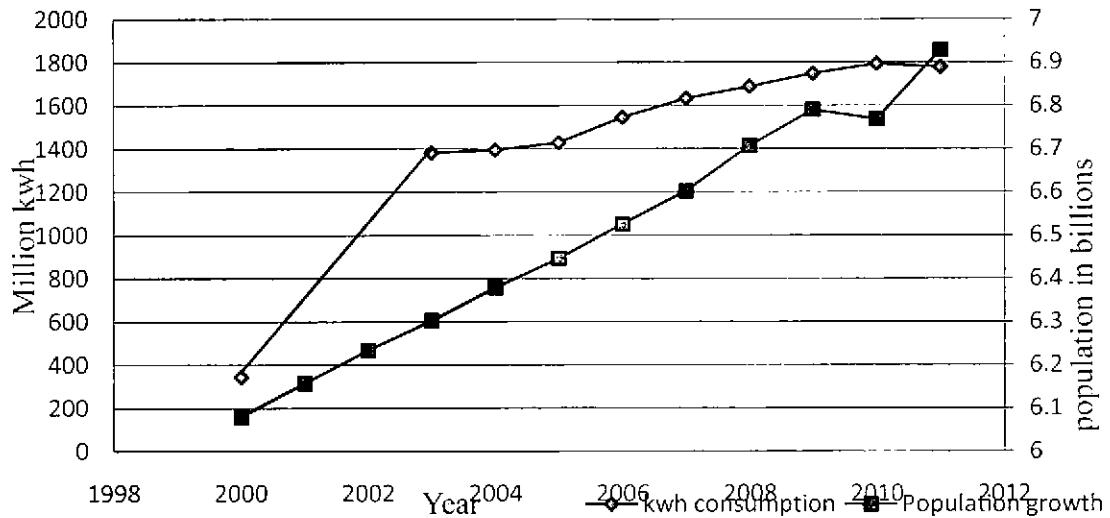


Fig. 1 World electricity consumption in (Million KWh) and World population in billion.

Distribution network is very significant in power delivery to the consumers, since it is the end link to the consumers, thus, it is essential to regular electric power supply. Unfavourable conditions would therefore affect power system operations and income generated by these utilities. Effective management of these distribution systems for continuous regular power supply is very essential for various reasons such as socioeconomic of a nation.

Generally, there are medium and low voltage distribution networks in a typical Power distribution system (Figure 2). Typical low voltage distribution systems include transformers, fuses, distribution lines and the consumer-end load, which is indicated in energy meter readings while medium include transformers, switches, isolators and distribution feeders.

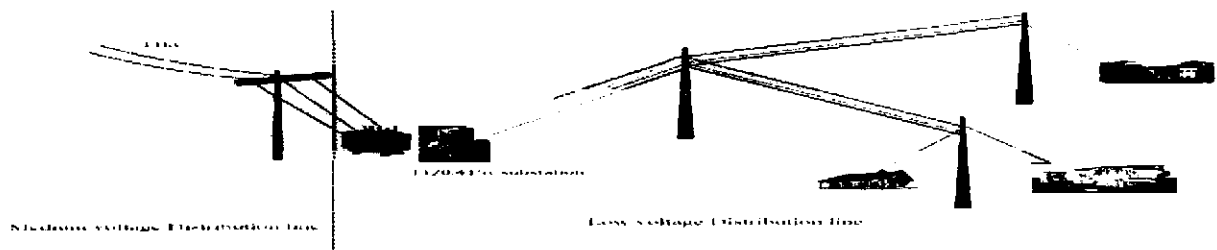


Fig. 2 Typical distribution system networks.