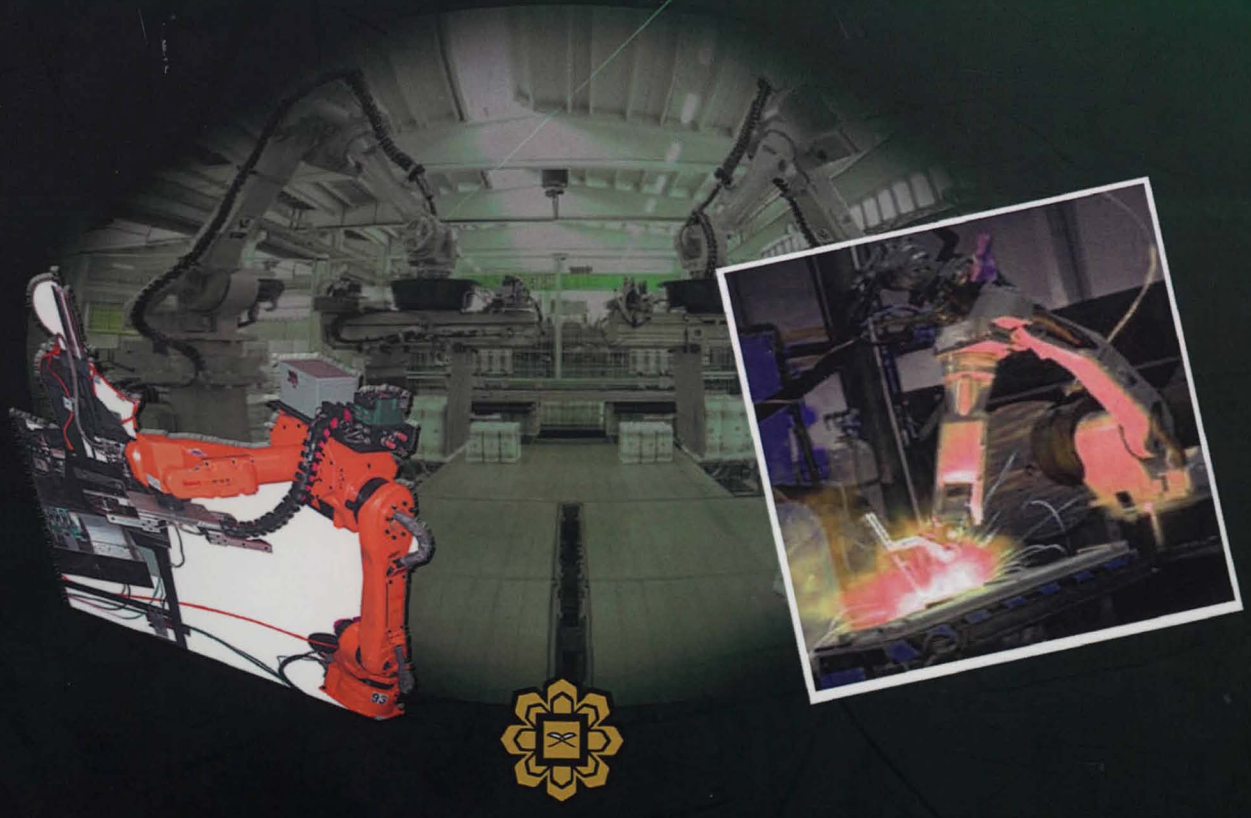
MECHATRONICS BOOK SERIES

ROBOTICS AND AUTOMATION

Rini Akmeliawati
Wahju Sediono
Nahrul Khair Alang Md. Rashid



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MECHATRONICS BOOK SERIES: ROBOTICS AND AUTOMATION

Editors

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TABLE OF CONTENTS

Preface i

Acknowledgement ii

Editor iii

Table of Content v

1. **Visual Tracking for Human Face** 1
   A.A. Shafie, Iqbal and M.R. Khan

2. **Robot Design : A Case Study of Team Learning Experience and Outcome** 7
   A.A. Shafie

3. **Development Neck Support for Humanoid Robot Head** 14
   A. A. Shafie, M.N. Kasyfi and N. I. Taufik Y

4. **Development of Cooperative Mini Robot** 21
   Amir A. Shafie , Siti E.M.Z and Shazeela A

5. **Humanoid Robot Arm** 26
   Amir A. Shafie and Mohd N. Y.

6. **Designing Human Robot Interaction for Emotionally Expressive Robotic Hear AMIR-III** 32
   A. Iqbal, A. A. Shafie, and M. R. Khan

7. **An Overview of Fuzzy Based Person Following Robot** 38
   T. Alamgir, I. J. Alfar and M. M. Rashid

8. **Mechanical Design of a Person Following Robot** 43
   Tarik Bin Alamgir, Ibrahim Jawad Alfar and Muhammad Mahbubur Rashid

9. **Development of Fuzzy Based Person Following Robot part 2** 49
Tarik Bin Alamgir, Ibrahim Jawad Alfar and Muhammad Mahbubur Rashid

10. **Mobile Robot for Fined Tube Inspection** 56
Muhammad Mahbubur Rashid

11. **Robot Aided Upper Limb Rehabilitation System: Mechanical Design**
Shahrul Na'im Sidek, Hidayatullah Mohamed Nawi 64

12. **Robot Aided Upper Limb Rehabilitation System: Electronics for Sensors and Actuators** 69
Shahrul Na'im Sidek, Khairul Anwar Khalid

13. **Robot Aided Upper Limb Rehabilitation System: Results and Analysis** 73
Shahrul Na'im Sidek

14. **Snake Robot Locomation in Narrow Space: A Review** 79
Raisuddin Khan, Mitsuru Watanabe and Masum Billah

15. **Multiple Hexapod Robot and Collaborative communication** 86
Raisuddin Khan, Masum Billah and Mohiuddin Ahmed

16. **Autonomous Unicycle Robot Using Reaction Wheel Pendulum: Mechanical Design** 94
Atika Adrina Teepol, Nur Fadhilah Mohd Fauzey, Shahrul Na'im Sidek, Yasir Mohd Mustafah

17. **Autonomous Unicycle Robot Using Reaction Wheel Pendulum: Controller Design** 103
Nur Fadhilah Mohd Fauzey, Atika Adrina Teepol, **Shahrul Na'im** Sidek, Yasir Mohd Mustafah

19. Develop an Algorithm for Goal Finding Robot using Reinforcement Learning 118
M. Kamal, R. Khan, S. Bazuhair and M. Billah

20. Design and Development of 2 Fingers Robotic Hand Actuated by Active Grasping Data 126
MdMozasser Rahman[1],MohdZoolfadli B MdSalleh

21. Design and Development of Interactive Fish Robot 144
MdMozasser Rahman[1],RizaMuhida and Mohammad Zukhair b MohdNazmi

22. Design and Development of A Digger Robot 154
MdMozasser Rahman,MohdRuzaini Bin AbdRalim and Others

23. Glass Wall Cleaning Robot: A Review 170
Md Mozasser Rahman, Ahmed Murgab Mohammed Mahil,
Norsofiana Bt Umar and Nurul Izzati Bt Samsuddin

24. Glass Wall Cleaning Robot: -Electrical design and control 177
Md Mozasser Rahman, Ahmed Murgab Mohammed Mahil,
Norsofiana Bt Umar and Nurul Izzati Bt Samsuddin

25. Glass Wall Cleaning Robot: -Electrical design and control 187
M. M. Rahman, M. R. b A. Ralim

26. Development of Robotic Manipulator to assist human using brain Signal 198
Mahbuba Hossain, Raisuddin Khan, and Masum Billah

27. Glass Wall Cleaning Robot: Mechanical Design 204
Mahbuba Hossain Raisuddin Khan, and Masum Billah

28. Intelligent SCADA Based Monitoring Scheme for Low Voltage Distribution System **210**
M. J. E. Salami, A. M. Aibinua, Mohd Shafie Bin Sani and Nurfaizal Bin Wahi

29. Intelligent SCADA Based Monitoring Scheme for Low Voltage Distribution System **218**
Abdullateef Ayodele Isqeel and Momoh Jimoh Eyiomika Salami.

30. Autonomous Goal Finding Robot **227**
M. Kamal, Md. R. Khan, Faisal and M. Billah

31. Intelligent SCADA Based Pipe Monitoring System **236**
M. J. E. Salami, A. M. Aibinua, Mohd Shafie Bin Sani and Nurfaizal Bin Wahi

32.Path Tracking of Car Like Mobile Robot **250**
A. A. Isqeela and M. J. E. Salami

33. A New Energy Efficient Building System **255**
M. J. E. Salami, Md. R. Khan, O. A. Abdulquadric

34. Automatic Car Parking System **262**
M. J. E. Salami, Md. R. Khan and O. A. Abdulquadria

35. Anthropomorphic biped robot **267**
A. A. Shafie, M. F. Baharudin

CHAPTER 27

Autonomous Goal Finding Robot

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27.1 Introduction

Autonomous goal finding mobile robot is a robot which can perform desired tasks in unstructured environments without continuous human guidance. The autonomous goal finding mobile robot has the characteristics of self learning which mean the ability of making decisions, having the capacity to act intelligently given only partial information and learning from their mistakes. The robot also will be able to learn about its environment to move about it with avoiding obstacle around in an intelligent manner to reach to the goal in the shortest possible path. Unlike other path planning or obstacle avoiding system which the goal is already determined and or the path to reach to the goal is already known [1-3]. This intelligent, learning system is intended to search for the goal, at its early stages, and then with sufficient time obtain the optimal path, minimum number of steps, to the goal [4].

Modern robotics engineers continually research the possibility to convert most of the devices that serves specific human purposes to "autonomous systems" so it will be more convenient and useful. Autonomous machines, in the present definition, are not only meant to be computational input-output devices, but it must have the capability to move around using their own motor modules and navigation systems guided by sensors, along with the ability of making decisions, having the capacity to act intelligently given only partial information (as minimum as possible), learning from their mistakes, adapting to heterogeneous and continuously changing environments [5-6]. Autonomous System Research (ASR) associated with Classic Artificial Intelligence is one of the most important current research fields. It is interested in "Intelligent Structuralism" to solve specific intelligence-related problems with pure structuralism intelligence techniques [7]. However, (ASR) is not the only field of robotics engineering that is currently being developed. Researchers of intelligent systems are trying to continuously develop and scientifically study the natural forms of the phenomenon "Intelligent Behavior". In more explanatory words, they are trying to logically and mathematically simulate and develop a programmable coding to allow robots to behave intelligently (like interacting with its environment) or more in human form (like walking or even running) [8-9].

Direction is slightly more difficult, but could be solved with a compass or a beacon the robot could use to initialize its bearings to every time it came by its home point. From the start node, it could venture off in a direction until it encounters an object, then record the direction and approximate distance based on time of flight, or the distance and stored information on a memory. Then move back to its start point. The robot would repeat this many times, each time from its start point in a slightly new direction.

27.2 The Development Process

Building up an autonomous robot is a complex task combining several technical disciplines like mechanical engineering, control engineering, electrical engineering, embedded systems