

**AUTONOMOUS MOBILE ROBOT
USING
PROGRAMMABLE LOGIC CONTROLLER**

**Thesis presented in partial fulfillment for the award of the
Bachelor in Electrical Engineering (Hons)
UNIVERSITI TEKNOLOGI MARA**



**MOHD LUTFI BIN ABDUL KADIR
Faculty of Electrical Engineering
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM, SELANGOR
NOV 2006**

ACKNOWLEDGEMENT

Alhamdulillah, all praises to the Mighty and Merciful ALLAH S.W.T because of His Will, I have been given the strength to complete the entire project and managed to finish this thesis.

During the process of completing this project I have met many people asking for their help and suggestions regarding my project. Here I would like to express my gratitude and most sincere appreciation to my project supervisor, Puan Rosidah binti Sam for her continuous contributions in giving me the invaluable idea of suggestions, guidance, comments and advices until I have finished my thesis.

I also want to thank my Programmable Logic Controller subject lecturer Dr. Ahmad Maliki b. Omar for his guidance and notes for the subject that enable me to understand clearly about PLC.

Nor to forget, special thank to my presentation panels, Dr. Anuar Haji Ahmad and Prof. Madya Dr. Haji Zainazlan for their comments and guidance during project presentation.

Finally, very special thank to all my friends who were involved whether directly or indirectly with me in this project.

Thank you very much.

ABSTRACT

Automation is very synonym to robotics. Automation is a sequence of operation that uses inputs to generate outputs that contain less or no human interruption. The term 'Robotic' is a science of designing and building a suitable instrument that is used for real-life applications whether in an automated manufacturing or non-manufacturing environments. Meanwhile 'Robot' is an instrument that is built by human to perform various tasks of operations continuously and precisely for human welfare. The work is done in an integrated manner resulting in increased of productivity with a guaranteed quality of output product. In the era of technology, robots are commonly used in almost all activities whether in industries or even at home. The development in robot technology has increased gradually as the time passes. Nowadays most robots are intelligent whereby they have "brains" that can sense the presence of input variables, map or locate the source of presence factor, plan for further step of actions and act according to the program being set by the programmer or Sense, Map, Plan and Act (SMPA) theory of operation [1]. It has many parts that are combined and connected together to become a complete instrument and equipment suitable to the given task or job.

TABLE OF CONTENT

| CHAPTER | DESCRIPTION | PAGE |
|----------------|------------------------------|-------------|
| | ACKNOWLEDGEMENT | i |
| | ABSTRACT | ii |
| | TABLE OF CONTENT | |
| | LIST OF FIGURES | |
| | LIST OF TABLES | |
| 1 | INTRODUCTION | |
| | 1.1 Project Background | 1 |
| | 1.2 Objectives | 2 |
| | 1.3 Scope of Work | 3 |
| | 1.4 Organization of Thesis | 4 |
| 2 | SYSTEM DESIGN | |
| | 2.1 System Introduction | 5 |
| | 2.2 Hardware Development | |
| | 2.2.1 Robot Design | 8 |
| | 2.2.2 Robot Base model | 9 |
| | 2.2.3 Robot Arm | 10 |
| | 2.2.4 Robot Gripper | 13 |
| | 2.2.5 Input Devices | |
| | 2.2.5.1 Proximity sensor | 14 |
| | 2.2.5.2 Photoelectric sensor | 16 |
| | 2.2.5.3 Limit Switch | 18 |
| | 2.2.6 Output Devices | 19 |
| | 2.2.6.1 Power Window motor | 20 |
| | 2.2.6.2 Small Johnson motor | 21 |

CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

The Autonomous Mobile Robot is an indoor multitask robot with collision-free maneuvers concept that accomplish certain tasks such as pick and place object and do cleaning process of vacuuming and sweeping dust in a pre-determined or set environment. The robot will complete the tasks while avoiding obstacles and able to prevent collision with unwanted objects in completing its objectives when reaching the destinations. The robot is equipped with sensors and limit switches so that it will able to connect with the outside world and be given the information about the environment.