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**INTELLIGENT MOBILE ROBOT FOR PICK AND PLACE
APPLICATION**

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MAY 2009

"I hereby declared that I have read through this report and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Mechatronic)"

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**This Report is Submitted In Partial Fulfillment of Requirements for the Degree of
Bachelor in Electrical Engineering (Mechatronic)**

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“I hereby declared that this report is a result of my own work except for the excerpts that have been cited clearly in the references.”

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ABSTRACT

This project is called as “Intelligent Mobile Robot for Pick and Place application”. This project is being proposed due to educational purposes. This Mobile Robot is suitable for educational because of the components and materials that will be use is easy to understand and easy to find. This project called as “Pick and Place” mean that this Mobile Robot will combine with robotic arm. The objectives of this project is to design and build more compact ,cheaper and functional Intelligent Mobile Robot for educational purposes by using PIC as microcontroller, extra sensor for measurement purposes and MikroC as its programme language. Extra sensor will be used in this project, so that, the measurement will be more accurate while avoiding obstacles and will work together with microcontroller to control the movement of the Mobile Robot, so that the Mobile Robot can move automatically from home to its goal.

ABSTRAK

Projek ini di namakan sebagai “Robot Bergerak untuk aplikasi ambil dan letak”. Tujuan projek ini di pilih adalah untuk tujuan pembelajaran. Projek ini sesuai untuk dijadikan sebagai subjek pembelajaran adalah kerana komponen dan bahan yang di gunakan dalam projek ini adalah mudah difahami dan mudah didapati. Projek ini di namakan sebagai “Ambil dan Letak” kerana projek ini akan di gabungkan dengan projek yang lain iaitu “Tangan Robot”. Objektif projek ini adalah untuk mereka dan membina Robot Bergerak yang murah dan mempunyai banyak kegunaan untuk proses pembelajaran dengan menggunakan PIC sebagai Pengawal mikro dan memproses arahan daripada pengawal, tiga sensor untuk tujuan pengukuran dan bahasa pengawal sebagai bahasa pengawal untuk PIC. Tambahan sensor digunakan dalam projek ini adalah bertujuan untuk mendapatkan pengukuran yang tepat dalam mengelak halangan dan bekerjasama dengan Pengawal mikro untuk mengawal pergerakan Robot Bergerak.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	SUPERVISOR'S DECLARATION	
	TITLE OF THE PROJECT	
	DECLARATION	ii
	ACKNOWLEDGEMENT	iii
	ABSTRAK	iv
	ABSTRACT	v
	TABLE OF CONTENTS	vi
	LIST OF TABLE	xi
	LIST OF FIGURE	xii
	LIST OF APPENDIX	xv
1	INTRODUCTION	
	1.0 Introduction	1
	1.1 Problem Statement	2
	1.2 Objective	2
	1.3 Scope of Work	3

1.4	Methodology	3
1.6	Organization of Report	6
1.7	Summary	6
2	LITERATURE REVIEW	
2.0	Introduction	7
2.1	History of Mobile Robot	7
	2.1.1 Elmer and Elsie (two autonomous robots)	7
	2.1.2 Mars Pathfinder Mobile Robot	8
	2.1.3 BigDog Mobile Robot	9
	2.1.4 Line Following Mobile Robot	10
2.2	Definition of Mobile Robot	13
	2.2.1 Microcontroller	13
	2.2.2 Programme Language	15
	2.2.3 Peripheral Interface Controller	17
2.3	Summary	18

3 THEORY AND DESIGN

3.0	Introduction	19
3.1	Circuit Design	19
3.2	List of Components	21
	3.2.1 Component explanation	22
	3.2.1.1 Voltage Regulator (78L05)	22
	3.2.1.2 Capacitors	23
	3.2.1.3 Resistors	23
3.3	Circuit Explanation	24
	3.3.1 Crystal Oscillator	24
	3.3.2 Reset button	24
3.4	Programme language	25
	3.4.1 MikroC Programming	25
	3.4.2 Source Code	25
	3.4.3 Hex File	26
3.5	Constructed the PIC microcontroller	28
3.6	Fabricated the PCB board	28
3.7	Equipment and tools used in etching process	29
3.8	Etching Process	30
3.9	Constructed the PIC microcontroller using strip board	33

3.9.1	Test functional of PIC microcontroller	33
3.10	Obstacle avoidance robot	35
3.10.1	Structure of robot	35
3.10.2	DC motor	38
3.11	Motor Driver: L298	38
3.12	Sensor	41
3.12.1	Infrared Sensor	41
3.13	Summary	42

4	RESULTS AND ANALYSIS	
4.0	Introduction	43
4.1	PIC microcontroller	43
4.2	Structure of the mobile robot	44
4.3	Motor Driver (L298)	45
4.4	Infrared Sensor	50
4.5	Programming	52
	4.5.1 Final program	55
	4.5.2 Motor Define deceleration	55
	4.5.3 Main program	59
4.6	The Final Result	60
	4.6.1 Testing functionality	61
4.7	Summary	62
5	CONCLUSION	
5.0	Conclusion	63
5.1	Suggestion	63
6	REFERENCES	65
7	APPENDIX	66-75

LIST OF TABLES

NO	TITLE	PAGE
1	List of Components	21
2	Reading voltage and current	46
3	Voltage (L298)	48
4	Voltage reading for both sensors	51

LIST OF FIGURES

NO	TITLE	PAGE
1.0	Flow chart of a Methodology	5
2.0	Elmer and Elsie	8
2.1	Sojourner Rover	9
2.2	Pairs of BigDog Robots	10
2.3	H-bridge motor drive circuit	11
2.4	Optical Wheel Rotation Sensor Circuit	11
2.5	Line Following Mobile Robot	12
3.0	Reference Circuit Diagram of PIC microcontroller	20
3.1	PIC microcontroller using Proteus 6 Lite	21
3.2	Voltage Regulator	22
3.3a	Capacitor with polarity	23
3.3b	Ceramic capacitor	23
3.4	Resistors	23
3.5	Connection of Oscillator to PIC	24
3.6	Circuit PIC microcontroller	28
3.7	Acid used in etching process	31

3.8	Circuit board	31
3.9	Failure PCB board	32
3.10	PIC microcontroller constructed using strip board	33
3.11	Connection with LED	34
3.12	Connection with LED	35
3.13	Robot body created by SolidWork	36
3.14	Acrylic used as robot body	36
3.15	Tamiya 70097 twin-motor gearbox	37
3.16	Turning purposes	38
3.17	Turning purposes	38
3.18	L298's pin connections	39
3.19	Bidirectional dc motor control	39
3.20	Design of Motor driver L298 circuit	40
3.21	Electromagnetic Radiation	41
3.22	Infrared detector sensor	42
4.0	PIC microcontroller	44
4.1	Robot body using acrylic	44
4.2	Structure of Mobile Robot	45
4.3	Connection L298 with PIC microcontroller	47
4.4	The program that written using Micro C	47
4.5	Testing for connection of motor driver	49

4.6	L298 motor driver	50
4.7	The value of distance infrared sensor	50
4.8	Connection of sensor and PIC microcontroller	51
4.9	Connection of the infrared sensor	51
4.10	Mikro C compiler for PIC	53
4.11	Device pane	53
4.12	Detect PIC icon	54
4.13	Open button	54
4.14	Program All button	55
4.15	Mobile Robot after assembled	60
4.16	Functionality of Mobile Robot	61-62

LIST OF APPENDIX

NO	TITLE	PAGE
1	Datasheet PIC16F877A	66-70
2	Gant Chart	71
3	Datasheet L298	72-75

CHAPTER 1

INTRODUCTION

1.0 Introduction

The title for this project is an **“Intelligent Mobile Robot for Pick and Place application”**. “Pick and Place” mean that this Mobile Robot will combine with robotic arm, so that it will become intelligent. The main purpose of this project is to design and build more compact and cheaper of Mobile Robot for educational purposes. Since nowadays there are a lot of Mobile Robot at the market in varieties of application, such as in security, delivery, building measurement, university educational or many more, but these Mobile robot that will be build is low in cost and more compact compared with the existing Mobile Robot and suitable to be used for educational purposes . By build this Mobile Robot, the basic of knowledge to do the Mobile Robot for other application can be easier.

In this project, PIC’s is used as a microcontroller due to their low cost, wide availability, large user base, extensive collection of application notes, and serial programming (and re-programming with flash memory) capability. MikroC is a multi-usage development tool for PIC micros that uses C language as its program language.

Besides combine with robotic arm, extra sensor will be use in this project to make this Mobile Robot become intelligent, so that, the measurement will be more accurate while avoiding an obstacles and its work together with microcontroller to control the movement of the Mobile Robot, so that the Mobile Robot can move automatically from home to its goal.

1.1 Problem Statement

Nowadays, there are many of Mobile Robot that have been build in the market but its design only fix for any certain application and the existing Mobile Robot is too big in size, so that it will be effect the motor due to large in weight, to overcome this problem, acrylic will be used in this project because of it's material is appropriate with this Mobile Robot and also by modifying the existing control circuit.

Existing Mobile Robot is not intelligent enough because of the sensor only stated in one side of the Mobile robot. The problem will occur while avoiding the obstacles due to the measurement will not accurate and sometimes it cannot avoid obstacles as well. Moreover there is necessary for the Mobile Robot which can move more flexibility and intelligent by adding and using the right sensor.

1.2 Objective

The objectives of this project are:

- i) to design and build more compact, cheaper and functional Intelligent Mobile Robot for educational purposes
- ii) to understand the operation of Intelligent Mobile Robot by construct the main components which are sensor, driver and PIC microcontroller.

1.3 Scope of Work

The scopes of work are:

- i) to study and determine the suitable controller
- ii) to analyze the capability of DC motors to support load
- iii) to study and choose the right sensor
- iv) to combine successfully with Intelligent Robotic Arm
- v) to understand concepts of PIC microcontroller and MikroC programming

1.4 Methodology

The word of Methodology is frequently used when method would be more accurate. In this project, the methodology is important chapter as the methodologies; design flow chart and construction of the project are discussed. The methodology of this project will deeply discuss.

First of all, there are separated into two phases to complete this project; The phase one is started with the literature review and followed by research through the internet and references book in PIC controller, motor driver and the MikroC programming. Next process is continuing with learn and familiarize with the C language by do the analysis and testing using the previous subject that have been learned before (MikroC). Then, design a suitable controller for the control purpose. In this part, the most suitable controller will be choose as a controller and the circuit will be constructed on the bread board for testing and modifying purpose by using the MikroC programming as program language.

For the phase two, after testing and troubleshooting in bread board, the circuit will be constructing on the PCB board and also the construction of the circuit for whole Mobile Robot including the programming will be done in this phase. Finally, the circuits will do the troubleshooting and testing to see either the circuit is function or not. Then, will be proceeding by analyze to the Mobile Robot. For more information, Figure 1.0 showed the flow chart of the methodology to explain more detail the flow of work:

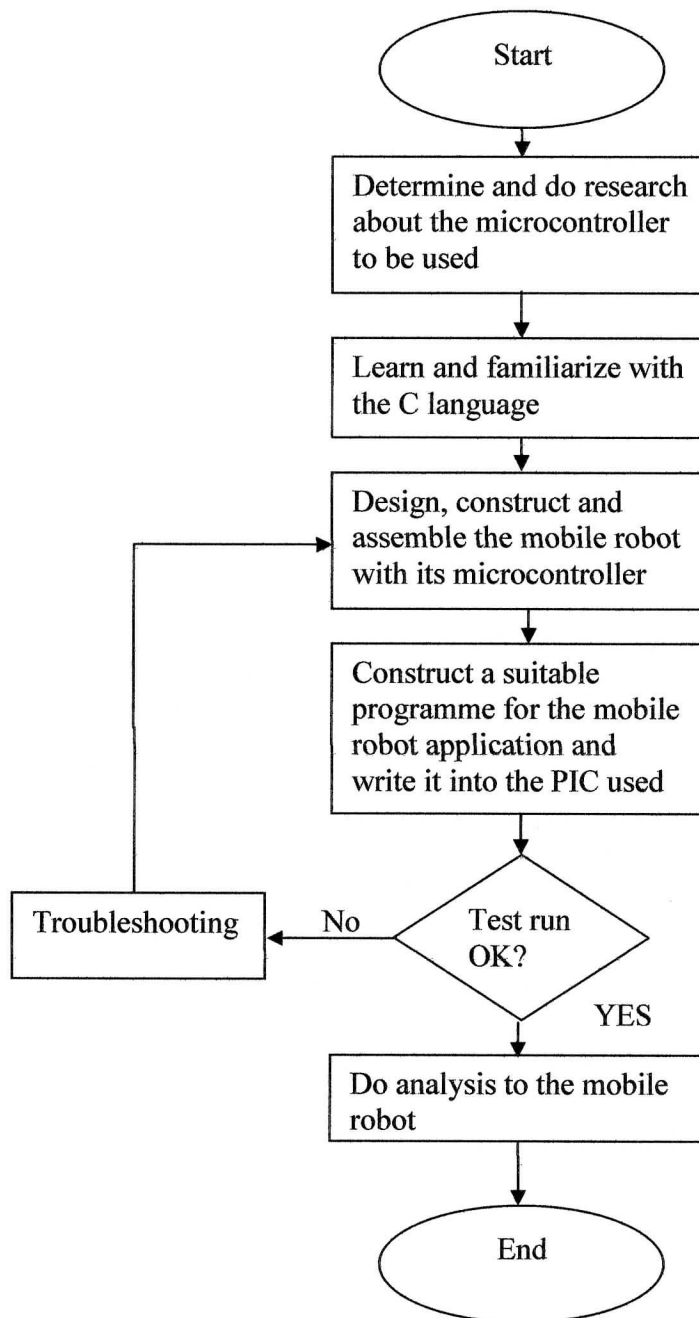


Figure 1.0 Flow chart of a Methodology

1.5 Organization of report

This report will be discussed about this project in five chapters which are for the first chapter about introduction of the project, problem statement, objectives, scope of work and methodology. For the second chapter literature review will be as references to build the Mobile Robot. In the third chapter, Theory and design of the project will be discussed. Fourth chapter will discuss about result and analysis that have been achieved while constructing the Mobile Robot. Finally, the fifth chapter is conclusion.

1.6 Summary

For this chapter, introduction, problem statement, objectives, scope of work and methodology have been described briefly to show the flow of the project and also each of the element have been clearly stated above to show the purpose of doing this project and also components that will be used in this project have been sated.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

First step that must do before start the project is the literature review. The purpose of researching about the project is to get more information and knowledge about it, so that it will guide to choose the appropriate components and materials that will be used in this project. The information can get in many sources example as internet or references books.

2.1 History of Mobile Robot

There are lot of Mobile Robot that existed in this world that can be apply in many of application such as for educational purposes, security and so on. Below will be discussed a few type of Mobile Robot that used different component and different applications.

2.1.1 Elmer and Elsie (Two Autonomous Robots)

In 1948 to 1949, the mobile robot in other application which are Elmer and Elsie (two autonomous robots that looked like turtles) have been build by W. Grey Walter using the light sensor and touch sensor as measurement purposes to avoiding or moving obstacles in their way as shown in Figure 2.0. The motor that have been used to control the movement of robot are propulsion motor and steering motor. For steering motor is used