

***(THE PROROTYPE OF A LGHT SEEKING ROBOT
USING PIC MICROCONTROLLER)***

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**THE PROTOTYPE OF A LIGHT SEEKING ROBOT USING
PICMICROCONTROLLER**

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**This Report Is Submitted In Partial Fulfilment Of Requirements For The Degree of
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ABSTRACT

This project is to build a prototype of a light seeking robot. The robot will be expected to seek or find the light through the maze. First and foremost, in order to verify the validity of the circuit, the PIC software will be used to tests it. The confirmation need to be done so as to make sure that the circuit is safe and obey the electrical principal, so that the designing process will work smoothly in the time given. The process will commonly cover up about the learning of the PIC Programme, the learning about the photosensors as a function to build up a circuit, and to integrate between the hardware and the software system. The experiment will be comprised of all the values of the sensor inversely proportional to amount of incident light and how to move the robot on the right direction.

CONTENTS

CHAPTER	TITLE	PAGE
	PROJECT TITLE	i
	ACKNOWLEDGMENT	ii
	ABSTRACT	iii
	CONTENTS	iv
	LIST OF TABLES	vii
	LIST OF FIGURES	viii
1	INTRODUCTION	
1.1	Introduction	1
1.2	Project Overview	2
1.3	Project Objective	2
1.4	Scope Project	4
1.5	Problem Statement	5
1.6	Project Methodology	5
1.7	Expected Results	8
2	LITERATURE REVIEW	
2.1	Introduction	9
2.2	Definition of Robot	10
2.2.1	A Short History of Robot	10
2.3	Light Seeking Robot Project	12
2.4	Mobile Micro-Robot	15
2.5	Obstacle Avoidance Robot	17
3	THEORIES, HARDWARE & SOFTWARE IMPLEMENTATION	
3.1	Hardware Implementation	20
3.2	Tools	20
3.3	Robot Chasiss	23
3.4	Locomotion System	23
3.5	Wheels and Caster Wheels	
3.5.1	Wheels	24
3.5.2	Caster Wheels	24

3.6	Robot Hardware Construction	25
3.7	Motor	
3.7.1	DC motor	27
3.7.2	DC motor operation	28
3.8	DC Motor Control	
3.8.1	H-Bridge IC	31
3.9	Light Sensor	35
3.1	Infrared sensor	
3.10.1	Infrared Receiver	36
3.10.2	Infrared Transmitter	38
3.11	Software Implementation	
3.11.1	PIC Microcontroller	40
3.12	The Software Implementation	
3.12.1	Proteus	43
3.12.2	PICCLite	43
3.12.3	IC Prog	33
4	METHADODOLOGY	
4.1	Introduction	44
4.2	Hardware Method	47
4.3	Software Method	49
5	PROJECT TESTING	
5.1	Testing IR receiver circuit with LED	50
5.2	Testing IR transmitter circuit with LED	52
5.3	Testing LDR sensor & record values	54
5.4	Testing sensor with positioning light source	55
5.5	Testing the function of H-bridge to DC motor	56

6	RESULTS & DISCUSSION	
6.1	Hardware Implementation Results	59
	Results of Light seeking	
6.1.1	behavior	60
6.1.2	Light seeking Mobile Robot Flow diagram	61
6.1.3	Light seeking movement	62
6.1.4	Obstacle avoidance behavior	63
6.1.5	Hardware circuit	64
	Software Implementation	
6.2	Results	
6.2.1	PIC circuit to H-bridge	67
6.2.2	Motor driver circuit	70
7	DISSCUSSION, SUGGESTION & CONCLUSION	
7.1	Disscussion	72
7.2	Suggestion	73
7.3	Conclusion	74
	REFERENCES	75
	APPENDIX	77

LIST OF TABLES

NO	TITLE	PAGE
2.1	Surface & current for Light seeking Mobile Robot	13
3.1	Tools	22
3.2	PIC Characteristic	41
5.1	LDR sensor testing values	54
5.2	LDR sensor testing with positioning light	55
5.3	Table of H-bridge testing values	57
6.1	Table of Light Seeking Algorithm	62
6.2	Table of Obstacle avoidance Algorithm	63
6.3	Robot program explanation	69
6.4	H-bridge table	71

LIST OF FIGURES

NO	TITLE	PAGE
1.3	Project Flowchart	3
1.6	Project Methodology Flowchart	7
2.1	L293N IC Diagram	14
2.2	Light seeking robot flow through path	14
2.3	Mobile Micro- Robot	15
2.4	Mobile Micro- Robot	16
2.5	Obstacle avoidance block diagram	19
3.1	Robot Chassiss	23
3.2	Robot wheel	24
3.3	Caster wheel	24
3.4	1st Layer of robot	25
3.5	2nd Layer of robot	26
3.6	9V, DC Motor	27
3.7	Current in DC Motor	30
3.8	Magnetic field in DC Motor	30
3.9	Force in DC Motor	31
3.1	Torque in DC Motor	31
3.11	H-bridge IC	31
3.12	H-bridge Block diagram	32

3.13	Circuit of H-bridge, motor1	34
3.14	Circuit of H-bridge, motor 2	34
3.15	Infrared setup	36
3.16	Receiver Module	37
3.17	Transmitter circuit	38
3.18	IR Receiver circuit	39
3.19	PIC16F877	40
3.2	Circuit for PIC Programmer	42
5.1	Experiment 1 output waveform	51
5.2	Experiment 2 output waveform	52
5.3	Test driver circuit	58
6.1	Block System Diagram for Light Seeking Mobile Robot	60
6.2	Light seeking Mobile robot Flow diagram	61
6.3	Hardware circuit	64
6.4	Sensor circuit	65
6.5	Robot Chasiss	65
6.6	Completed Robot	66
6.7	PIC simulation circuit	67
6.8	Motor driver simulation circuit	70

LIST OF APPENDIX

NO	TITLE	PAGE
1	How to use PIC Microcontroller	77
2	L293B IC	80

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Nowadays, robot is an industry in our life. Robots is also important in entertainment, aerospace, agriculture and manage to help human in daily life. Those entire activities can be done effectively and impressive with the energy of robots. For example, in the factory, robot can help to reduced cost, increased productivity and improved product quality [1].

For my final project, I am supposed to build a prototype of a light seeking and obstacle avoidance mobile robot. This robot must be able to seek for the source light using the LDR / light sensor as the input and also able to avoid the obstacle avoidance using the Infrared sensor as input. This robot will be able to seek for the source light and at the same time it will avoid the obstacle through it.

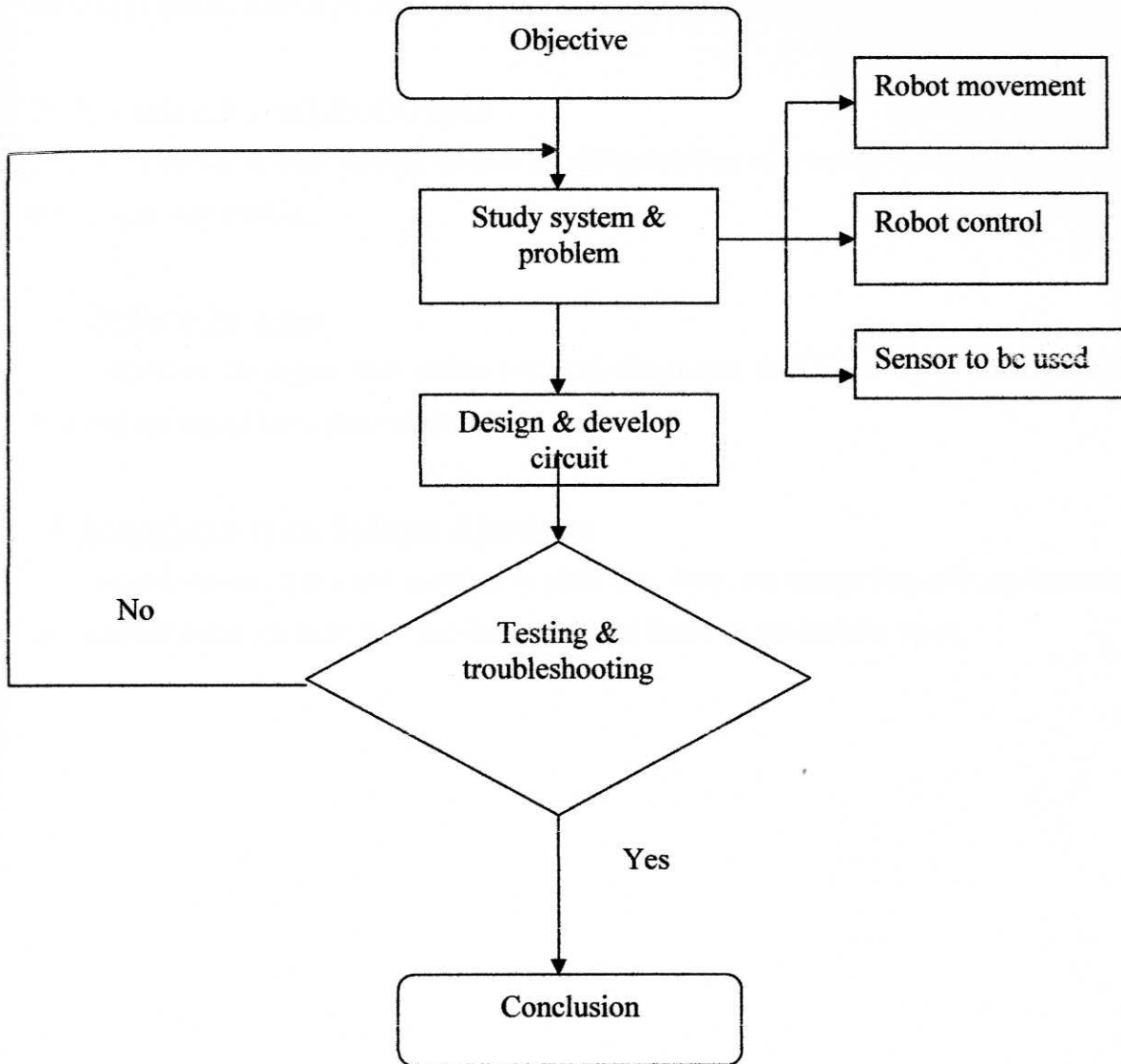
1.2 PROJECT OVERVIEW

This project is to construct a prototype of a light seeking and obstacle avoidance mobile robot. This project will cover up the hardware and software phase construction. For hardware part, this project needs to build up the mobile robot, design, and complete phototransistor sensor circuit, Infrared receiver and transmitter circuit, and motor circuit. Phototransistor sensor is one of the important parts to guide the robot to detect the light source. While the Infrared sensor as the part to guide the robot to avoid the obstacle avoidance in order to seek for the light. For the motor circuit, DC motor will be used along with the H-Bridge IC, to connect the motor to the PIC16F877a. While the software that will be used in this project is MPLab, that has been used to program the PIC 16877a Microcontroller.

1.3 PROJECT OBJECTIVE

This project is to design and built up a prototype of a light seeking robot. The main point is using the PIC 16F877a as the microcontroller and the PIC Programming as the software. This will cover many different experiments with different control techniques to investigate how the robot will move, how the LDR sensors will function, how the infrared guide the robot to avoid obstacle, and how to relate with the driver circuit, which is the motor circuit, and lastly will be compile together and build up a light seeking and obstacle avoidance mobile robot. To resolve the validity of the circuit, the confirmation will be done by simulate the circuit in a PIC software.

PROJECT FLOWCHART.



Flowchart 1

1.4 SCOPE PROJECT

1) Choose the appropriate circuit.

- a lot of studies need to be done in order to pick up the best circuit and choosing the most appropriate circuit for different parts in this project.

2) Simulating & verifying the circuit

- after design & built circuit, need to verify/simulating whether the circuit is working or not working

3) Clarifying the signal

- clarified the signal that comes out from the sensor & IC, and try to simulate and find out the signal from the output.

4) Integrating between Software & hardware

- after hardware parts and simulation parts was done, the integrating process between the hardware and software will needed in order to function the mobile robot.

1.5 PROBLEM STATEMENT

PROBLEM 1:

-A mobile robot normally will not move through the right path, because of some error, such as localization error, sensor error, IC & electronic component error, and also less accurate with mechanical of the robot.

PROBLEM 2:

-To design programming based on the functions of robot.

1.6 PROJECT METHODOLOGY

This project includes hardware and PIC software. The hardware phase is to design and develop prototype of a light seeking and obstacle avoidance mobile robot and was controlled by the PIC Microcontroller.

Description:

1. **Literary Research**

Research, ideas and to gather important information. This part also has discussion about the design and the operating system of the whole project.

2. **Design and Built up Circuit**

Designing and built up the appropriate circuit for the operating of the project. This will includes analysis of the sensors, and the output produced.

3. **Establish Design Circuit**

After finish designing process, the circuit have to be simulated. This part also included the design and plan setup for the hardware phase, plus with the hardware operation.

4. **Establish Hardware**

Interfacing LDR sensor, Infrared transmit and receiver circuit, both sensor's system, the PIC 16F877a circuit, and the driver circuit. All components are gathered together to be connect and construct, according to design a circuit.

5. **Programming using PIC software**

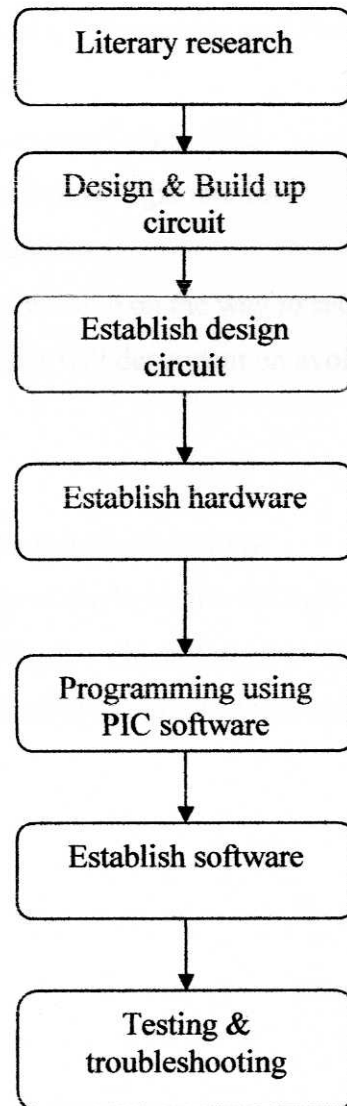
For this project, the PIC 16F877a was been used. So, the software that must be used is PIC software. A detail study on the program must be done before programming the project. So, for this PIC program, Micro-C, IC prog (HEX. file) and Proteus 6.7 software will be used

6. **Establish Software**

All circuit that will be used, will be simulate in Proteus 6.7 program (PICCI.ite). Then the circuit will be programmed then simulation will be run.

7. **Testing and Troubleshooting**

All the circuit will be testing and troubleshoot in software program, and also in hardware, by connecting all the components according to the circuit.



Flowchart 2: Project Methodology

1.7 EXPECTED RESULTS.

- 1) Working as a prototype of a light seeking and obstacle avoidance mobile robot.
- 2) Light Seeking Behaviour:
 - The robot seeks out and moves toward light
 - Speed of the robot dependant on light intensity.
- 3) Obstacle avoidance Behaviour:
 - The robot will avoid the obstacle on the way to seek for the light.
 - The movement of the robot will dependant on avoiding the obstacle's position.

The robot like a vehicle with the following options:

- 1) Speed based on intensity of the light into the light sensor.
- 2) The robot will avoid obstacles which it senses with its active infrared sensors.
- 3) Rotation sensor for indicating speed, distance, and motor problems.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Robot can be classified in two categories, which are; mobile robot and fixed mobile robot. For this project, it can be categorized as a mobile robot type. So, first step that I need to do is make a literature review about this light seeking mobile robot. A lot of research needs to be done before I move to choose and design the most appropriate circuit for my project [2]. There are 3 general down to earth rules were written by Isaac Asimov about robot, there are:

- 1) A robot may not injure a human being, or, through inaction, allow a human being to come to harm.
- 2) A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
- 3) A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

2.2 DEFINITION OF ROBOT

The word robot comes from Czech word “robota”, that means forced labor by the Czech writer Karel Capek in 1921. according to the Webster dictionary, it means; “ An automatic device that performs functions normally described to human or a machine in the form of a human (Webster,1993) [3] .

2.2.1 A SHORT HISTORY OF ROBOTS [1] .

1. **1921** - The first reference to the word robot appears in a play opening in London. The play, written by Czechoslovakian Karel Capek, introduces the word robot from the Czech robota, which means a serf or one in subservient labour. From this beginning the concept of a robot takes hold.
2. **1946** - George Devol patents a general purpose playback device for controlling machines. The device uses a magnetic process recorder. In the same year the computer emerges for the first time. American scientists J. Presper Eckert and John Mauchly build the first large electronic computer called the Eniac at the University of Pennsylvania. A second computer, the first general-purpose digital computer, dubbed Whirlwind, solves its first problem at M.I.T.
3. **1951** - A teleoperator-equipped articulated arm is designed by Raymond Goertz for the Atomic Energy Commission.
4. **1954** - The first programmable robot is designed by George Devol, who coins the term Universal Automation. He later shortens this to Unimation, which becomes the name of the first robot company.
5. **1959** - Planet Corporation markets the first commercially available robot.

6. **1964** - Artificial intelligence research laboratories are opened at M.I.T., Stanford Research Institute (SRI), Stanford University, and the University of Edinburgh.

7. **1968** - SRI builds and tests a mobile robot with vision capability, called Shakey.

8. **1970** - At Stanford University a robot arm is developed which becomes a standard for research projects. The arm is electrically powered and becomes known as the Stanford Arm.

9. **1973** - The first commercially available minicomputer-controlled industrial robot is developed by Richard Hohn for Cincinnati Milacron Corporation. The robot is called the T3, The Tomorrow Tool.

10. **1974** - Professor Scheinman, the developer of the Stanford Arm, forms Vicarm Inc. to market a version of the arm for industrial applications. The new arm is controlled by a minicomputer.

11. **1976** - Robot arms are used on Viking 1 and 2 space probes. Vicarm Inc. incorporates a microcomputer into the Vicarm design.

12. **1977** - ASEA, a European robot company, offers two sizes of electric powered industrial robots. Both robots use a microcomputer controller for programming and operation. In the same year Unimation purchases Vicarm Inc.

13. **1978** - The Puma (Programmable Universal Machine for Assembly) robot is developed by Unimation from Vicarm techniques and with support from General Motors.

14. **1980** - The robot industry starts its rapid growth, with a new robot or company entering the market every month.