

Global Positioning System (GPS) Guided Mobile Robot

MOHD AIZZUDDIN B MD JANIS

**Final Year Project Report Submitted in
Partial Fulfilment of Requirement for the
Degree of Bachelor of Engineering (Hons) Electronic (Instrumentation)
In the Faculty of Electrical Engineering
Universiti Teknologi Mara**

JULY 2013

ACKNOWLEDGEMENT

Firstly, I want to express my thankfulness to Allah s.w.t for giving me an opportunity and strength to complete this final year project. Secondly I want thanks my family for giving me financial and moral support throughout this final year project.

I also would like express my gratitude and my respect to my project supervisor, Assoc. Prof Dr Rosidah Sam for her guidance, monitoring, constant encouragement and moral support throughout the course of this final year project. To all my friends, thank you for all the support you have given to me during the course of this final year project. I am very grateful for all your help that have been given to me.

Last but not least, I would like to express my gratitude and thankfulness to everyone that directly and indirectly helped me during this final year project in any ways. Thank you.

TABLE OF CONTENTS

TOPIC	PAGE
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF ABBREVIATION	x
ABSTRACT	xi
 CHAPTER 1 INTRODUCTION	 1
1.1 BACKGROUND AND PROBLEM STATEMENT	1
1.2 SIGNIFICANCE OF STUDY	3
1.3 OBJECTIVES	3
1.4 SCOPE OF STUDY	4
 CHAPTER 2 LITERATURE REVIEW	 5
2.1 GENERAL INTRODUCTION	5
2.2 GLOBAL POSITIONING SYSTEM	5
2.3 LOCALIZATION	6
 CHAPTER 3 METHODOLOGY	 8
3.1 METHODOLOGY OF GPS GUIDED MOBILE ROBOT	8
3.2 HARDWARE PART	9
3.2.1 EM406A GPS MODULE	9
3.2.2 MAX232	10
3.2.3 PIC18F4550 AND SB40 TARGET BOARD	11
3.2.4 ENHANCED 10AMP MOTOR DRIVER MDC10	13
3.2.5 MOBILE ROBOT PROTOTYPE	14
3.3 SOFTWARE PART	15
3.4 TESTING AND TROUBLESHOOTING	19
3.4.1 GPS MODULE TESTING	19
3.4.2 PROTOTYPE TEST RUN	21
 CHAPTER 4 RESULT AND DISCUSSION	 23
4.1 GPS MODULE TESTING	23
4.1.1 IN CLOSED ENVIRONMENT	23
4.1.2 IN OPEN ENVIRONMENT	26
4.2 GPS GUIDED MOBILE ROBOT TEST RUN RESULT	29
4.3 DISCUSSION	29

ABSTRACT

Global Positioning System (GPS) Guided Mobile Robot

This thesis represents the design of GPS guided mobile robot using GPS Module EM406A and PIC18F4550. The scope of this project involves in both hardware and software development. The EM406A is used to provide localization and navigation of the mobile robot. The signal produced by EM406A is in RS-232 signal level, so serial communication must be used to communicate with the PIC18F4550.

The data that is collected from the EM406A is compared and used to control the direction and Pulse Width Modulation (PWM) of the DC motor. This project development is started with literature review where all information and requirement regarding the project is collected. The requirements of the project are GPS Module EM406A, PIC18F4550, MAX232 and DC Motor.

Keywords: EM406A, PIC18f4550, MAX232 and DC motor.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND PROBLEM STATEMENT

Global Positioning System is a satellite navigation system that provides information on time and position in all-weather condition, anywhere on or near the Earth surface where there is no obstructed line of sight by more than four GPS satellite. This system provides the military, civil and commercial user important capabilities for everyday usage. This system is maintain by the USA government and can be accessed by anyone around the world using GPS receiver.

Mobile robot is a machine capable to move around its environment automatically. Depending on the environment, the mobile robot may use DC motor and wheels or Stepper motor and propeller to move around the environment. By using GPS as its guidance system, the mobile robot may be able to navigate the environment from point A to point B without any help from human. This is allow the mobile robot to move around the environment autonomously, provided there is no obstacle inside that environment

Localization or position estimation is a source of problem for outdoor autonomous mobile robot. With static or dynamic obstacle, for an outdoor mobile robot to navigate around is a very hard task. Recent research states that each sensor such