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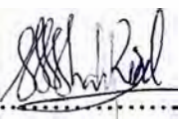
Design an intelligent line following mobile robot for charity application in mosque / Nurul Fatihah Johan.

**DESIGN AN INTELLIGENCE LINE FOLLOWING
MOBILE ROBOT FOR CHARITY APPLICATION IN
MOSQUE**

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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 Mechatronic Engineering”

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**DESIGN AN INTELLIGENCE LINE FOLLOWING MOBILE ROBOT
FOR CHARITY APPLICATION IN MOSQUE**


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**This Report Is Submitted In Partial Fulfillment Of Requirements For The Degree of
Bachelor In Mechatronic Engineering**

**Fakulti Kejuruteraan Elektrik
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May 2009

“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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ACKNOWLEDGMENT

Assalamualaikum W.B.T

Firstly, I want to say Alhamdulillah, a sincere Praise to Allah The Almighty since with His Power and Authorization, I have completed my progress report of my final year project for the Bachelor of Mechatronic Engineering successfully.

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ABSTRAK

Tujuan projek ini adalah mereka bentuk robot bergerak yang cerdas mengikut garisan untuk aplikasi pendermaan di masjid. Robot bergerak telah banyak digunakan secara meluas untuk aplikasi di industri di dalam kehidupan seharian kita. Ia adalah robot bergerak automatik yang mampu bergerak pada setiap keadaan. Tujuan projek ini adalah untuk memastikan robot bergerak mengikut sepanjang garisan putih dan berhenti apabila berhadapan dengan objek yang menghalang laluan. Ia hanya tertumpu di masjid ketika sembahyang jumaat. Robot bergerak ini dikawal oleh program PIC yang disambung terus ke litar pengawal. Robot akan mengesan garisan putih menggunakan IR pengesan yang diletakkan di bawah robot dan satu lagi IR pengesan diletakkan di tepi untuk mengesan halangan. Pengesan ini dikawal oleh program dalam PIC pengawal mikro. Robot ini juga dipandu oleh dua motor DC yang dikawal oleh PIC pengawal mikro. Kelajuan robot bergantung pada PWM (perubahan lebar denyut). Motor DC ini digunakan untuk menggerakkan robot ke arah hadapan. Ia akan bergerak terus sepanjang garisan putih dan berhenti apabila pengesan mengesan halangan yang berhampiran ia. Selepas beberapa saat di mana pemasa dikawal oleh program, robot tersebut akan bergerak ke hadapan kembali. Robot bergerak ini akan bergerak sepanjang garisan putih yang diletakkan di hadapan 'saf' untuk memudahkan orang meletakkan duit ke dalam kotak yang diberikan.

ABSTRACT

This project is to design an intelligence of line following mobile robot for charity application in the mosque. Mobile robots have been widely used of application in the industry as well as our daily life. An automatic mobile robot is capable of movement in a given environment. The purpose of this project is to make sure the mobile robot follows along the white line and stop while when it comes face to face with obstacles. It is focus only in the mosque on the Friday prayer. The PIC programming that is attached directly to the controller circuit controls this mobile robot. The robot detects the white line by using two IR sensors consists of transmitter and receiver that are put under the mobile robot and the two other sensors are located at the side to detect any obstacles. The program in the PIC microcontroller board controls this sensor. This robot is driven by two DC motors which are controlled by the program in the PIC 16F877A microcontroller board. The speed is determined by using the pulse width modulation (PWM). This DC motor is used to move the robot in forward direction. It goes forward along the white line and stops if the sensors detect any obstacles nearby it. After a few second that is the timer is controlled by the programming, the robot will go forward again. The mobile robot will move slowly along the white line that is in front of the 'saf' to get easy to people to put the money in the box given.

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LIST OF ABBREVIATION

PIC	-	Peripheral Interface Controller
PWM	-	Pulse Width Modulation
DC	-	Direct Current
IR	-	Infrared Red
LED	-	Light Emitting Diode
A/D	-	Analog –to-Digital
BJT	-	Bipolar Junction Transistor
CPU	-	Central Processing Unit
RAM	-	Random Access Memory
ROM	-	Random Original Memory
I/O	-	Input and Output
DIP	-	Dual In-line Package
SMD	-	Surface mount device
R/W	-	Read and write
PCB	-	Printed circuit board

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Robotic technology becomes popular lately because it can be used in several ways to assist people for doing many tasks. This kind of robot has a programmer that imitates the actions by humans. The mobile robot has to be able to do something physically where the robot get information from its surroundings. An intelligence mobile robot means that the robot can move smoothly, precisely using multiples degrees of motion and it can do something like human being so that the human does not need to do anymore. Briefly, the robots now facilitate the human's work. The line follower is a self-operating robot that detects and follows a line that is drawn on the floor. The basic operation of the line following is a capture line position with optical sensors. Most are them are using photo-reflectors. The line sensing process needs a high resolution and high robustness. There are two line or path styles, white line on the black surface or black line on the white surface.

In this project, the intelligence mobile robot has to move and follow a line and detect an obstacle and stop the robot short of it in order to avoid a collision. The project is to expose people with device that has been use in the recent mobile robot system. The main component that can make the mobile robot become intelligence is a sensors. The sensors can allow them to adapt to environmental changes and that is why it is used in many applications. With the using of Infrared (IR) sensor, the mobile robot has to be

able to detect the white line and obstacles. Programmable Integrated Circuit (PIC) is used as a controller and the motor control was performed with motor driver that is used to run the DC motor. The mechanical parts of the robot are the DC motor with the rear wheel drive and castor wheel.

In this project, the researcher about the components that involves has been done in order to get the best component to build the mobile robot. By developing the sensor, hardware and software from mikroC as its program language, the project enables me to get deeper understanding of what is required in design of a mobile robot.

1.2 Problem Statement

Each thing that we do must have a reason, same as this project as the problem arise it lead the new idea to make this learn ware. Charity is a good way to assist in helping poor people. The Muslims are encouraged to donate as one of the way to help this poor people. Before this, the side of mosque only supplies the tin, the prayer will pass through by hand to other prayer, and it may cause an interruption among them. In order to minimize the problem, this mobile robot are able to moves forward automatically and follows the white path and the prayer no need anymore to passing the tin back, just put the money into the mobile robot.

Furthermore, there are too many donate box and make the pray's environment become chaotic and with this kind of project, we can reduce the quantity of donate box because here we are only using one donate box that is mobile robot. Besides that, the donate box cannot using in a long period. This kind of project is more efficient, more economically and useful.

1.3 Project Objective

These projects have their own objective to achieve and overcome the problems that stated before these projects have been developed. Before the project successfully done, there is an objective to be achieved. One of the main objectives of this project is to design an intelligence line following mobile robot for charity application that is usually had been done in mosque.

The purpose of this project is to make sure the mobile robot follows along the white path and stop while when it comes face to face with obstacles. It is focus only in the mosque on the Friday prayer.

1.4 Project Scope

The project scope is actually more specifically concentrate about the concept of mobile robot. The mobile robot is a robot that capable to move in a given environment. Mobile robot was designed with integrated hardware and software to follow a line where the hardware includes the PIC 16F877A circuit, motor driver L239B circuit and IR sensor circuit whenever the software is about the programming in how to control the robot. The programming will make the robot to follow a line or path but not in a free movement. The programming is building in mikroC software and simulate through the Proteus.

1.5 Methodology

The methodology is an important part because here the flow and construction of the project are discussed. The methodology of the whole project is covered here as shown in Figure 1.1. This part is important because it determines whether the project objective is achieved or not.

According to the methodology that is already planned and discussed, the project is started with the research from library and internet. For develop this project, research must be done in order to fill it in the project. After recognize the main objective and scope for this project, source which relate to this project have been analyze. The research is more from the Internet because much information can get form this source. Information from internet can be useful, as the information in it were newest information. The information from internet also explained theory from the books which are difficult to understand. Journal paper also useful, the research from other people helped in find content for this project.

After research has been done, the structure of the robot is designed and the circuit is constructed. In this section, the most suitable component and circuit is selected together and study the programming. Simulation is also a part of project. It contains of programming where the designer can decide the function and motion of the mobile robot. First, we need to create a programming and simulate the simulation that has been done from MikroC compiler. If the result is achieved, the next step is to download the PIC and then attach to the mobile robot.

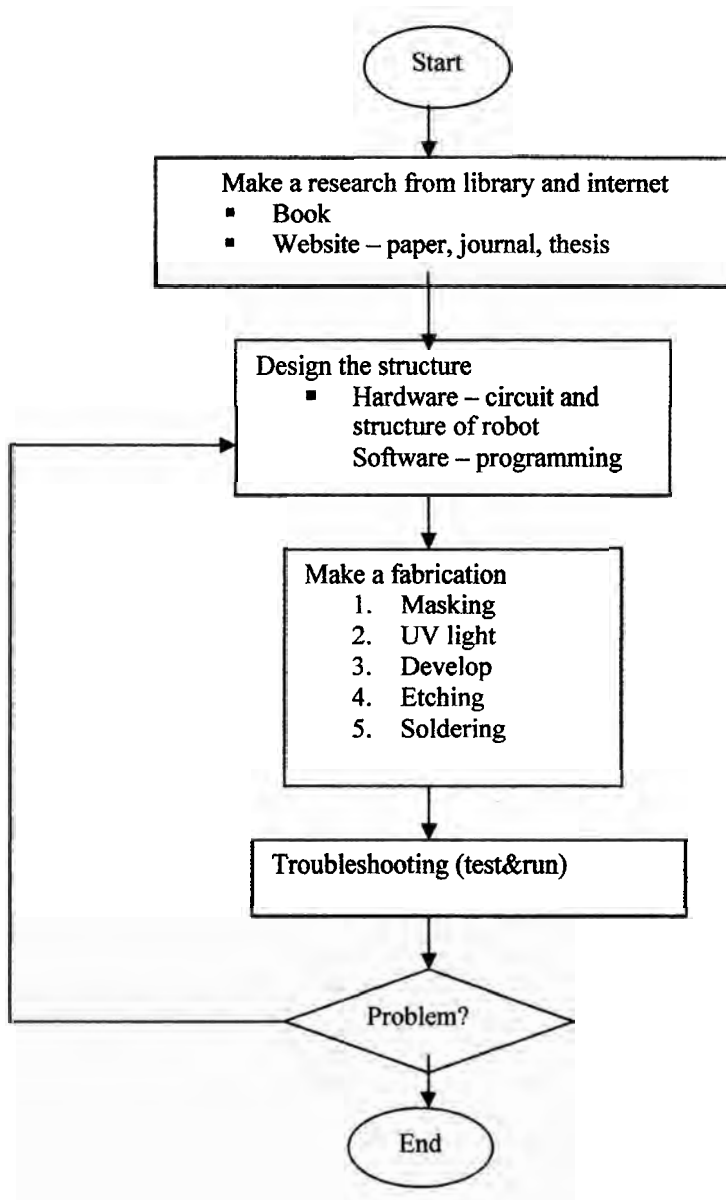


Figure 1.1: Flowchart of project.

1.6 Project Outline

In this project outline, an overview from every chapter will be explained. In the chapter 1, it is about overview and an introduction for the project that reader can understand overall of the project.

On the chapter 2 it is about the research for project, paper work, book and other information that related with the topic that has been suggest. The literature review that have been done come up with the summary and analysis which can help in develop this project. Theory and Design in chapter 3 explains the theory about the main components involves in this project. This chapter will explain and elaborate about the circuit design, components features, etching and soldering process and analysis about the working operations of components.

Chapter 4 covered the result and analysis from this project hardware and software. It also showed the analysis from this project. Chapter 5 includes the conclusion of the summary of this project. The suggestion also been added so that, the project can be added with more information in the future.

1.7 Summary

For chapter 1, it is explained about an overview that gives a main idea about this project. Problem statement give a problem that occur and the solution come with the project that has been suggested. Objective section will elaborately detailed about project objective that need to be achieve. Project scope which in scope part have focus about the concept of mobile robot.

CHAPTER II

LITERATURE VIEW

2.1 Introduction

Literature review was an activity for researcher to research about project or paper work that has been done by someone else. The advantages and disadvantages must be taken as a guideline in order to make the project successful. From the previous research, we can use it for our guidance to create another project that is not exactly the same, but could be much better than the original one. Paper work or journal that related with special robotic should be take, as it can help in the future if problem occur, it also help in collecting theory background because journal or paper work is new from the theory that we get in book.

2.2 DIY Line Following Robot 2

The topic above is the simple line following robot that already have been done and publish by Greg Lipscomb. From the project observations that have been done will be divide by two parts which is the problem and solution of his project.

The problem is to be build a Lego robot with sensors, a motor controller, and a microcontroller that follows a black tape. After reaching the end of the tape, the robot will pause for three seconds and after pausing for 3 seconds, it will return to the starting point. The next step in an engineering problem is to come up with a solution [4].