CHAPTER 1

INTRODUCTION

1.1   Overview

First of all, this project was about to build a robot that can detect line using vision system. The robot was equipped with webcam and then will be interfaced with Personal Computer (PC). The function of the webcam was to detect the required line. PCI 1710 (Data Acquisition Card) will be used to make connection between the robot and PC. Four wheels would be used to build this robot. Two of the wheels would be placed in front of the robot and the other two behind the robot. The both wheels in front were controlled by two power window motors. Meanwhile, the rear wheels was followed the movement of the front wheels.

The software that used in this project was MATLAB R2010a. In the software there are two important parts that concentrated on which are Image Acquisition Toolbox and Image Processing Toolbox. Next, in the Image Acquisition Toolbox, video had been created to make the real time database. After that, in the Image Processing Toolbox several techniques were applied to make sure that the hardware run smoothly. Image processing was most directly concerned with manipulating raw image data with a view to generate improved images for eventually viewing by humans.

According to America Meteorology Society, image processing was the use of automated or manual techniques to provide the means of assessing, pre-processing, extracting features, classifying, identifying, and display the original image or processed imagery for subjective evaluation, interpretation and further interaction with the data. The techniques were image enhancement, image filtering and image restoration.

Then, Graphical User Interface (GUI) also would be created to display the image that captured by webcam. By using the 'GUIDE' Layout Editor, a GUI can be layout easily just with clicking and dragging. This GUI was to help the process of the project to be shown clearly on the laptop. Furthermore, this GUI would make people or our self to make analysis easily when they saw the progress on the computer screen.

1.2　Problem Statement

Commonly, when a car move through a road, it is possible that the car will wander from the designated area or drifted. Then, this will cause an accident to occur. So, from the situation this system was developed to make improvement for the car to avoid any accident occur. This project designs a simple prototype of robot and then develops software that can control the robot to follow straight white line. This will use same concept to apply in the car, although in reality the road have the white line in both side right and left.

1.3　Objectives

The objectives of this project are:
- i. To design a prototype robot to follow a straight white line using vision system
- ii. To develop a software that can manage to do error correction while follow straight line

1.4   Scope of Project

In this project the scopes consist of:

i.   Build a prototype robot that can detect straight white line

ii.   Interface a webcam with a PC using MATLAB R2010a

iii.   Interface a prototype robot with a camera and a PCI 1710 (Data Acquisition Card)

1.5   Thesis Outline

This thesis are composed of five chapters covering introduction, literature review, methodology, result and discussion, and the last one is conclusion and recommendation in future work.

Chapter 1 will cover about the introduction of the project that is consist of overview, problem statements, objectives and also the scopes of project. Robot, MATLAB R2010a software are the main essential in this project.

Chapter 2 focused on the literature review that has important information to the project. All the journals and books that are related to this project are used as a reference to guide and help completing this project. Each of the components is explain based on this finding.

Chapter 3 explains and discuss about the methodology that has been used in order to complete this project. There are two parts in this chapter which are the hardware development and software implementation. The discussion will be focusing on how to interface hardware with PC and webcam.

Chapter 4 will explain the detail about results and analysis produced during the completion of the project. Other than that this chapter is showed about the method that used to reduce the error while the robot detects straight white line.