CHAPTER ONE

INTRODUCTION

1.1 Preface

Robot manipulators consist of three main parts: mechanical, electrical, and control. In the mechanical point of view, robot manipulators are collection of serial or parallel links which have connected by revolute and/or prismatic joints between base and end-effecter frame. The robot manipulators electrical parts are used to run the controllers, actuators for links motion and sensors, which including the following subparts: power supply to supply the electrical and control parts, power amplifier to amplify the signal and driving the actuators, DC/stepper/servo motors or hydraulic/pneumatic cylinders to move the links, and transmission part to transfer data between robot manipulator subparts. Control part is used to adjust the timing between the subparts of robot manipulator to reach the best trajectory. It provides four main abilities in robot manipulators: controlling the manipulators movement in correct workspace, sensing the information from the environment, being able to intelligent control behavior and processing the data and information between all subparts.[1]

The fuzzy control is one kind of expert controls. It has been used extensively in applications such as processcontrol. One of its main benefits is that it can incorporate a human being’s expert knowledgeabout how to control a system, without that a person need to have a mathematicaldescription of the problem. [2]

1.2 Problem Statement

Most control systems of robotic car suffers from communication system between car and controller, they communication modes can be wired or wireless. Both methods have problems, they work for limit range to control, suffer from noise and they face security issues.

1.3 Proposed Solution

A proposed algorithm is used fuzzy logic techniques by using analytical and numerical techniques. This algorithm leads to make robotic car self driving.

1.4 Aim and Objectives

The main aim of this project is to design an obstacle avoidance system by using fuzzy logic.

The four main objectives:

1. To study control system the used for obstacle avoidance.
2. To simulate a proposed circuit.
3. To implement a fuzzy logic.
4. To evaluate the Performance of proposed circuit.

1.5 Project Scope

In order to achieve the objectives of the project, there are several scopes had been outlined. The scopes of the project are:

1. Develop the hardware for the system.
2. Ultrasonic sensors are applied as an obstacle detection of the robot. The detection
3. Range is within 2 cm until 200 cm.
4. Robot develop consists of two wheels and each of them are drive using DCmotor.
5. Fuzzy logic inference method used in this project is Mamdani Fuzzy Logic.
6. The robot able to avoid the obstacles on the flat surface, from any starting point.

1.6 Methodology

This is for obstacle avoidance. It consists of ultrasonic sensor which transmits the ultrasonic waves from its sensor head and again receives the ultrasonic waves reflected from an object. DC motors to convert direct current (electrical energy) into mechanical energy. LCD used for displaying results. The main component is ATMEGA16 microcontroller which receives the reading from sensor to determine reactions of the system.

The algorithm is a Fuzzy Decision Making Controller which is a type of fuzzy logic controller (FLC). This type of Fuzzy Logic can be used for controlling a process i.e., a plant in control engineering terminology which is non-linear. The advantage of FLC is that it enables control engineers to easily implement control strategies

which can be used by a human operator.

The components of FLC are an inference engine and a set of linguistic IF-THEN rules that encode the behavior of the robot car.

1.7 Research outlines

Chapter One: Introduction gives an overview about using fuzzy in obstacle avoidance systems.

Chapter Two: Literature Review highlights the system components and previous studies.

Chapter Three: System design shows the proposed system and explains the system structure and flow chart.

Chapter Four: Simulation results.

Chapter Five: Conclusion and recommendation.