CHAPTER ONE

INTRODUCTION

1.1 General Concepts

The servomotors are usually small and high precision motors, which can be used in several engineering applications .They can be found in CD and DVD players, mobile security cameras, microwave ovens, drive control systems of antennas and radars, copying machines, printers, scanners, valves automatically controlled and many other devices.

This project presents modern method to development speed and position control of a servo motor that including the PID and fuzzy logic controllers.

Is a very common and famous control algorithm which is widely used in industrial control systems? The algorithm might be implemented in a DC servo motor, for speed and position control, other applications will be considered. The gain limit of the controller is defined as the highest proportional gain that can assumed at system, without integral and derivative actions, where the system remains on its threshold of stability.

The advantages of FLC are such as simplicity of control , low cost and the possibility to design without knowing the exact mathematical model of the process. The structure of FLC consists of the following 3 major components which the first one is that used for measurement of the input or definition of the fuzzy sets that will applied. The second one is fuzzy control or rule base which provides the system with the necessary decision making logic based on the rule base that determine the control policy. The third method is defuzzifier which combines the actions that have been decided and produce single non-fuzzy output that is the control signal of the systems.

1.2 Problem Statement

There are some problems occurring while controlling the DC servo motor, The problem occur such as loss and efficiency of the servo motor. To encounter the problem , the controller is needed. There are too many controllers now adays but PID and Fuzzy Logic Controller are chose to interface with the DC servo motor because they are suitable for application which has nonlinearities aspect such as the speed of the DC servo motor. The antenna control system which currently available on the market and described as a servo controlled antenna use gears and feedback potentiometers is one of the nonlinearity system need to use controllers in order to improve the response and stability of the system.

1.3 Objectives

The main aim of project as a follow as:

- To study the theory of operation of servo motors.
- To study the application of position control system of servo motor.
- To investigate the performance of position control of servo motor using PID and fuzzy controller.
- Great a simulated design in MATLAB and compare the simulated model with the physical design.
- Improve responses performances for DC servo motor by PID and fuzzy logic implementation.
- To obtain the same analysis results as the Control Systems Engineering textbook on the same Antenna Azimuth Position Control System.

1.4 Methodology

- Study all the previous studies in the field.
- Achieving the desired responses close to actual response by implementing fuzzy logic algorithm to apply the position control of servo.

- Design Proportional Integral and Differential controller (PID) controller using the MATLAB.
- Analysis plot shows the transient and steady state response of the system.
- Mathematically model the system in MATLAB.
- The simulation for the practical was performed in PROTEUS program SIMULINK.

1.5 Project Layout

This thesis consists of five chapter: Chapter one presents an introduction to the principles of the study, the reasons and motivation and also discusses the objectives and outline of methodologies of the study .Chapter two discusses a theoretical background of DC servomotor, PID controller and fuzzy system controller and satelite dish system . Chapter three presents servomotor modeling and the circuit component; Chapter four includes simulation results and the practical implementations and operation. Finally, Chapter five provides the conclusion and recommendations.