

FUZZY SPEED CONTROLLER FOR DC MOTOR DRIVES

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Report submitted in partial fulfillment of the requirements for the award of the
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JUNE, 2013

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ABSTRACT

This project is to design and develop a speed control method using fuzzy logic for smart temperature control. Fuzzy logic technique is a smart control system which able to make decision on multi-value logic. Fuzzy logic system is analyzed using word rather than numbers, so it makes fuzzy logic closer to human intuition and able to utilize tolerance for imprecision. The fuzzy logic control will be implemented by using a micro controller PIC 18F4550 which able to receive and sending the data and become a platform for fuzzy inference system. Sensor will be used to detect the variable while DC motor will be used as output or actuator. C-language programming will be used as assemble language for programming and develop the algorithm and interface.

ABSTRAK

Projek ini adalah untuk merekabentuk dan membangunkan satu kaedah kawalan kelajuan menggunakan logic kabur untuk kawalan suhu pintar. Teknik logic kabur adalah satu system kawalan pintar yang dapat membuat keputusan mengenai logik multi-nilai. Sistem logic kabur dianalisis menggunakan perkataan bukannya nombor, jadi ia membuatkan logic kabur dekat dengan gerak hati manusia dan dapat menggunakan toleransi bagiketak persisan. Kawalan logic kabur akan dilaksanakan dengan menggunakan pengawal mikro PIC 18F4550 yang dapat menerima dan menghantar data serta menjadi platform untuk system kesimpulan kabur. Sensor akan digunakan untuk mengesan pembolehubah manakala DC motor akan digunakan sebagai output atau penggerak. Pengaturcaraan bahasa C akan digunakan sebagai bahasa untuk memasang program dan membangunkan algoritma dan muka.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

There are many types application that using DC motor for their operation such as, steel rolling mill, electric car, robotic, and so on. This application usually involve with the control system that use to manage their speed operation. My project based on DC Motor speed control using fuzzy logic system. The development of this project divided into two parts which is software and hardware development.

For the hardware section, a microcontroller will be used as a main control unit, while the input is temperature sensor and the actuator is DC motor. The motor will be controlled by H-Bridge Driver which can provide precise control for the system. For the software part, C-Language program will be used as instruction method to program the microcontroller. Fuzzy logic logarithm is implemented in the microcontroller along with the interface program for input (sensor) and output (DC motor).

1.2 PROBLEM STATEMENT

- i. Non-Fuzzy is complicated to derive and interpret program if system involved with highly precision value.

- ii. Non-Fuzzy controller has a long set point recovery and high overshoot which is makes it less appropriate for high speed application (Non Linear Operation).
- iii. Whole configuration of Non-Fuzzy system need to be change if any modification needed by the system operation, compared with fuzzy that only need an average changing.

1.3 OBJECTIVE

- i. To study and obtain the knowledge about Fuzzy Logic system operation, micro controller, motor drives, and other component that related with the project.
- ii. To identify the problem, implementing, and improve to exchange the knowledge in troubleshooting and problem solving.
- iii. To design and develop fuzzy logic instruction and the operation circuit to control DC motor speed using the Microcontroller

1.4 SCOPE OF PROJECT

- i. Design and develop circuit by using Microcontroller, input, and output component.
- ii. Develop software which is to Program Fuzzy Logic instruction in Microcontroller.
- iii. Interface both software and hardware.

CHAPTER 2

LITERATURE RIVIEW

2.1 INTRODUCTION

This chapter refers to all the paper works, and references that gain from various sources. It's including all important studies which have been done previously by others researchers. The related work has been carefully referred with some knowledge and recommendation from the previous work will be implemented for this project.

2.2 FUZZY LOGIC

For this section, I had done some journal review with detail about Fuzzy Logic and its application. I have reviewed some journals that provide me vast information about fuzzy logic and their implementation on microcontroller, and also excellent information for my project development. The journal is “Fuzzy Logic Microcontroller Implementation for DC Motor Speed Control” by Yodyium Tipsuwan and Mo-Yuen Chow, and the other one is “Design and Implementation of Fuzzy Logic System for DC Motor Speed Control” by Dr. Maan M.Shaker and Yareeb M.B. Ismeal Al-Khashab.

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