

SMART VACUUM CLEANER USING FUZZY LOGIC

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ACKNOWLEDGEMENTS

I would like to express my gratitude to ALLAH S.W.T for the mercy, blessing and strength given to me to complete this thesis. With HIS blessing and bestowed, I was able to complete this thesis on time and successfully.

This project of ‘Smart Vacuum Cleaner Using Fuzzy Logic’ wouldn’t be as good as this without the help and advice from my dedicated project supervisor Puan Nor Salwa Damanhuri. Special thanks for her supervision, critics, encouragement and guidance. I thoroughly enjoyed the challenge of discussing various aspects of my project with her which helped me to improve my project considerably.

I also would like to send my warm regards to friends for helping me with the valuable ideas and contribution through out my project and also not forgetting my family for a good support and encouragement in a progress to complete this project successfully.

Finally, I would like to thank to all person that involve directly or indirectly in this project with full willingness in contributing their efforts, time, energy and idea in helping me completes this thesis. There are no other words that would be able to express my feeling of gratitude towards them except thank you.

ABSTRACT

Fuzzy control method and algorithms, including many specialized software and hardware available on the market, may be classified as one type of intelligent control. This is because fuzzy system modeling, analysis and control incorporate a certain amount of human knowledge into its component such as fuzzy sets, fuzzy logic, and fuzzy rule bases. This thesis deals with the modeling of the vacuum cleaner using fuzzy logic controller by using MATLAB and Simulink software. In this thesis, the model of the smart vacuum cleaner Fuzzy Logic Controller (FLC) is developed by using Matlab Fuzzy Logic Toolbox and Simulink. The FLC designed in this project has two inputs and one output where the first input is the types of surface and the second input is the types of dirt or dirt condition on the surface. The output of this FLC is the suction power where this output signal will be used as the voltage supplied to the suction motor. Four shapes of membership function will be tested and the shape that can produce a good result due to the output signal and time response will be used in the FLC. The result of this FLC is the output signals that were produced by the controller will give the output value based on the inputs implemented to the FLC.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Fuzzy logic is an innovative technology that enables the implementation of intelligent functions in embedded systems. One of its advantage is that even complicated functions and adaptive control loops can be implemented with the limited resources and allows human to design a control strategy based on the individual user's needs.

The smart vacuum cleaner using fuzzy logic is a device that can operate itself. This device can be placed on the ground place anywhere in the room, and the vacuum cleaner automatically starts vacuuming and will finish its job without human intervention.

This smart vacuum cleaner controller is the improvement of the vacuum cleaner exists today where the suction power will only change based on the types of dust. The advantages of this smart vacuum cleaner is it can change it suction power based up to five conditions of dirt and also three types or conditions of the surface.

1.2 OBJECTIVES

The main objective of this project is to design the Fuzzy Logic Controller for the smart vacuum cleaner. The controller proposed structure will be designed to replace and improve the existing vacuum cleaner where the cleaning process is based on dirt condition only. The new controller should result by the output response based on the condition of the dirt and surface types.

The controller is developed by using Fuzzy Logic Toolbox in MATLAB 7.4 and will be implemented to MATLAB/Simulink 7.4. There are two major parts in implementing the FLC of the smart vacuum cleaner.