DC MOTOR SPEED CONTROL BY USING PULSE WIDTH MODULATION

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ABSTRACT

Today, there are many types of dc motor controller that had been designed. Engineers had designed new methods of speed control which improve the performance of the motor.

Motor controllers are very important especially to dc motors where they are used currently in many industries. Dc motors have several variable characteristics and are used extensively in variable speed drives. They also can provide a high starting torque and also possible to obtain speed control over wide range. The methods of speed control are normally simpler and less expensive than those of ac drives.

In this project, speed control using Pulse Width Modulation (PWM) is designed using a power electronic circuit. The development of advanced power electronics switching devices [1] enable high frequency switching operations and has improved the performance of PWM inverter for driving a dc motor. This method is more effective and efficient compared to the traditional method controller where the speed of dc motor is controlled by varying the amplitude of voltage. The design of the circuit is simulated by Orcad Release 9 Software before fabricating into hardware.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, dc motor speed control techniques have become more advanced. The development of new technique of motor controller has made it more economical, longer life performance and better accuracy. Implementations of power semiconductor device in dc motor control such like MOSFETs, IGBT and GTO has made the controller to operate in higher current or higher voltage.

There are many methods to control dc motor but this project is specific on low voltage dc motor control using Pulse Width Modulation (PWM) [2]. Low voltage dc motor is being used in many applications especially for small size applications. It been used as computer ventilation fan, remote control antenna, wheel chair and many other applications.

Most people prefer high efficiency small motors especially used as part of equipment in surgery or robotics. The motor itself must fulfill the specifications before it can operate with high efficiency. To control the speed of motor, it will depend on the type of motor and it application [3].

There are two type of pulse modulation technique normally used in dc motor control. There are Pulse Amplitude Modulation and Pulse Width Modulation. Both of them have their own advantages suitable for their operation. For PWM it is more effective and more efficient compared to PAM where the amplitude of the voltage in PAM is varied. As in this project, the amplitude of voltage is constant at 12V.