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FINAL REPORT OF DIPLOMA PROJECT

STEPPER MOTOR CONTROLLER

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The increase in confidence in this project has motivated us to come with more informative, comprehensive and innovative accepted project that would not only benefit us but also the future students.

Last but not least, we hope that this project will serve to enhance development to the user.

ABSTRACT

Stepper Motors are electromechanical motion devices, which are used primarily to convert information in digital form to mechanical motion. These motors rotate at a predetermined angular displacement in response to a logic input. Whenever stepping from one position to another is required, the stepper motors are generally used.

As their name implies, stepper motors rotate in discrete steps, each step corresponding to a pulse that is supplied to one of its stator windings. Step sizes may range from less than a degree to 15° or larger. The stepper motor can turn clockwise or counter-clockwise, depending upon the sequence of the pulses that are applied to the windings.

Typical applications include paper feed motors in typewriters and printers, positioning of print heads, pens in XY plotters, recording heads in computer disk drives, worktable and tool positioning in numerically controlled machining equipment and any other application where rotation in both directions, angular incremental changes, and continuous or stepwise displacements are required.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

One of the fastest growing markets in industry is power electronics. Power electronics implies the use of electronic circuits with rating suitable for controlling the operation of high-power application such as motor drives, uninterruptible power supplies, induction heaters, automotive ignition systems, battery chargers, and flexible AC transmission system (FACTS) devices.

Since high power electronics components have become available at affordable cost, variable-speed AC drives have become the first choice for new installations. In the not too-distant future the majority of AC motors will have some type of electronic controller. The stepper motor is one of the new types of motor that computer have created.

Stepper motors are special motors that are used when motion and position have to be precisely controlled. As the name implies, stepper motors rotate in discrete steps, each steps corresponding to a pulse that is supplied to one of its stator windings. Depending on its design, a stepper motor can advance by 90° , 45° , and 18° or by as little as a fraction of a degree per pulse. By varying the pulse rate the motor can be made to advance very slowly, one step at a time, or to rotate stepwise at speeds as high as 4000r/min. Stepper motors can turn clockwise or counter-clockwise, depending upon the sequence of the pulses that are applied to the windings.

The behavior of a stepper motor depends greatly upon the power that drives it. The power supply generates the pulses, which in turn are usually initiated by a microprocessor. The pulses are counted and stored, clockwise (CW) pulses being (+) while counter clockwise (CCW) pulses are (-). As a result, the net number of steps is known exactly at all times. It follows that the number of resolutions is always precisely known to an accuracy of one step. This permits the motor to be used as a precise positioning device in machine tools-Y plotter, typewriters and printers. In this project report, we will cover the circuit operation of our project. We will also discuss the components used to actuate these machines.