

Implementation FPGA of Motor Speed control using VHDL Language (Xilinx)

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Abstract- Stepper motors are versatile, brushless, synchronous motors that are widely used in a variety of applications. Stepper motors can also be known as step motors or stepping motors, and there are multiple types of stepper motors. Because stepper motors can move in accurate, discrete angular increments (steps) in reaction to electrical input pulses, they are ideal for applications that require controlled, precise movements. The amount of rotation produced by a stepper motor directly corresponds to the number of electric pulses, while the motor's speed is proportional to the frequency of the pulses. A stepper motor can only take one step at a time and each step taken is of the same size. The brushed DC motor is the classic motor that is used in applications like motorized toys, appliances, and computer peripherals. This type of motor is inexpensive, efficient, and especially useful for providing high speed and power in a relatively small package.

Index Terms- DC Motor, Stepper Motor, Applications

1. INTRODUCTION

Step motors are simple to operate with open loop configuration. Although they are small in size, they provide excellent torque at lesser speed. Our stepping motors are relatively inexpensive and are maintenance free. NMB stepper motors are being increasingly used in applications across a variety of industries, particularly for those applications that require perfect coordination and synchronization of the moving parts of equipment, precision angle incremental changes,

Automotive Industry Applications

Within the automotive industry, applications such as: Instrument cluster gauges – including speedometers, tachometers, temp gauges, and fuel gauges

Head light adjustment motors

Lumbar support devices

Air control valves

Throttle body motors

Idle air control valves

Windshield wiper motors

Medical Industry Applications

Stepper motor is used to great advantage in medical devices that are used both in the laboratory and patient-care settings, including:

Laboratory automation equipment for sample transport and preparation

Plate readers for clinical analysis

Liquid and specimen handling systems

Storage retrieval systems

In vitro diagnostic devices

Chromatography

Blood-oxygenating pumps

CT scanners

CPAP and BiPAP devices

Medical device engineers, medical equipment engineers, medical equipment manufacturers, medical product designers, and medical equipment designers are all using NMB stepper motors in their work.

2. INDUSTRIAL AUTOMATION

Industrial Automation Engineering Applications provides stepper motors for a range of industrial automation engineering applications. Our stepper motor is used in products from winding machines to pumps and valves. The industrial applications in which NMB stepper motors are an important component include:

Postal / letter sorting machines

Motor coil winding machines

Fluid power valves and pumps

Small robotics

Textile machines

CNC milling and welding machines

Automated concert lighting
 Gaming machines
 3D printing / rapid prototyping machines
 Office Equipment and Server Applications
 stepping motor is an integral part of a variety of machines used in offices, including:
 Fax, copier, and printer machines
 Phone and PBX boards

3. ADVANTAGES OF STEPPER MOTORS

There are three primary types of stepper motors: the permanent magnet stepping motor, the variable reluctance stepping motor, and the hybrid stepping motor. The type of stepping motor you should choose for your application depends upon the application's speed and torque requirements. To know which type of motor is best for your application, stepper motor has excellent response time to starting, stopping, and reversing along with superior repeatability and accurately returns to the same position. Every stepper motor has reduced maintenance requirements and provides high quality, long life, and high reliability. To find the stepper motor for your application,

4. DC MOTOR

This type of DC motor has a split ring device called a commutator around the middle. When DC power is applied, the electromagnetic energy pushes the armature away, causing rotation. When the armature becomes aligned horizontally, the commutator contacts with an electrical “brush”, reversing the polarity and causing it to rotate the other way. This happens again on the other side, resulting in continuous motion.

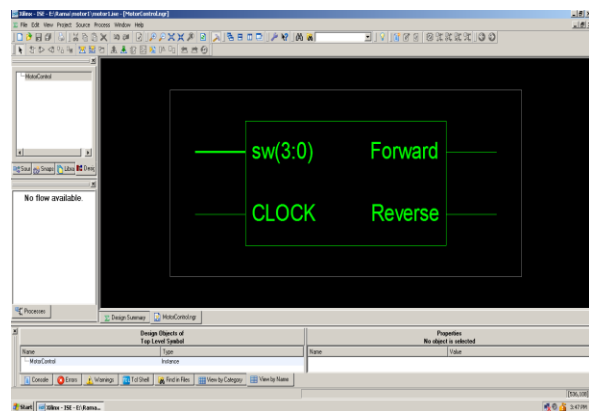


Figure-1 Schematic diagram

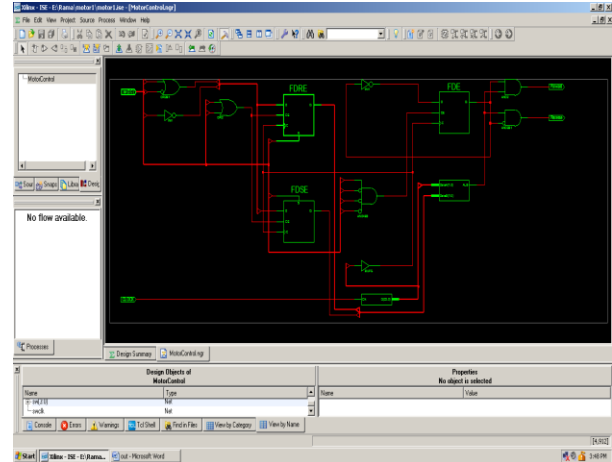


Figure-2 Technology Schematic diagram

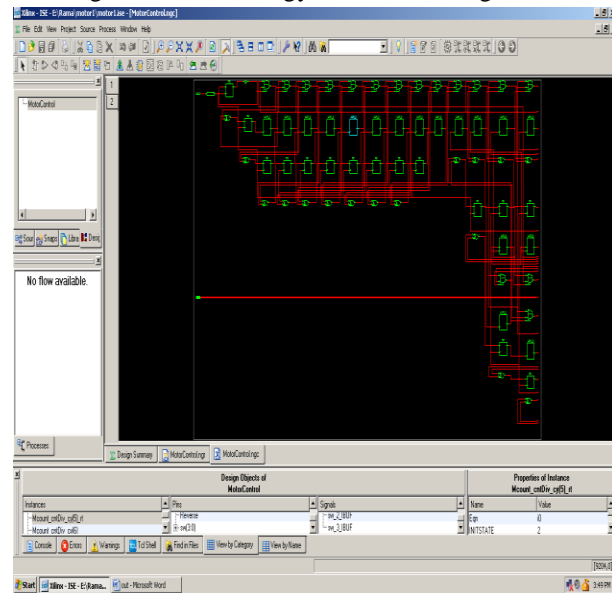


Figure-3 Design Schematic diagram

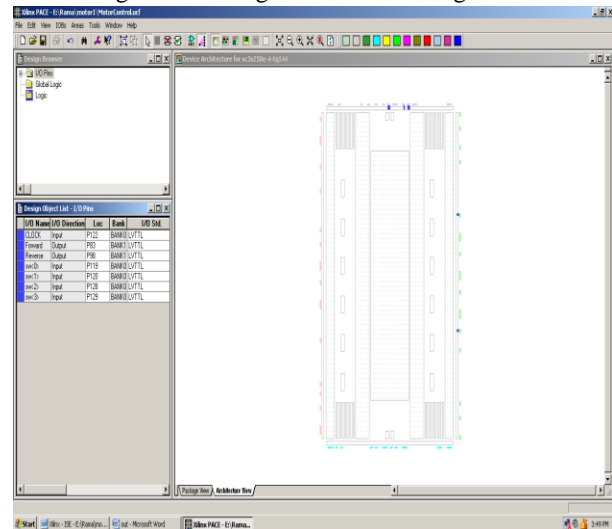


Figure-4 Input & Output Package Design Schematic Diagram

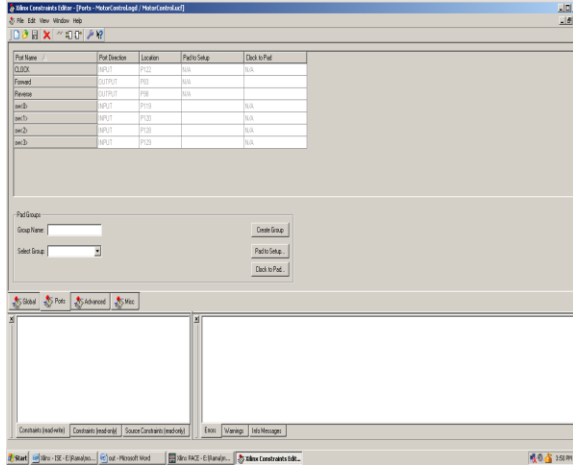


Figure-5 Input & Output Ports Schematic Diagram

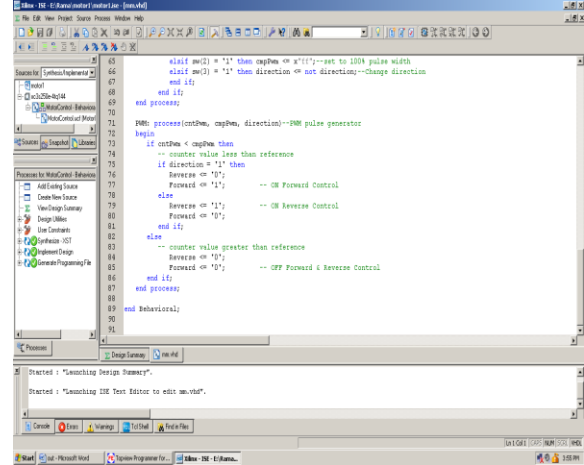


Figure-6(c) Forward and Reverse control Motors

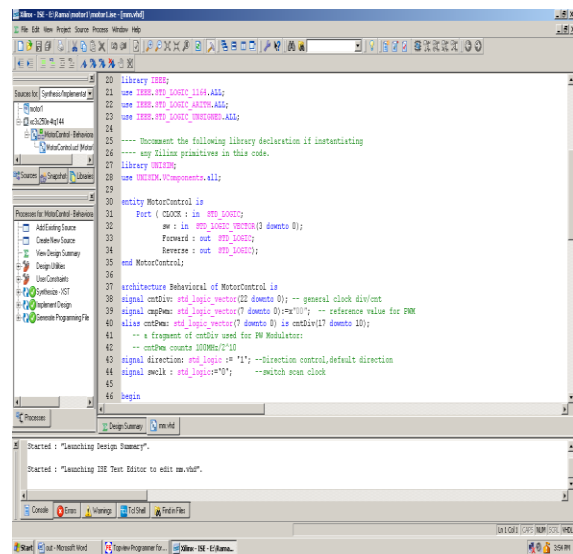


Figure-6(a) Port and Architecture initialization variables

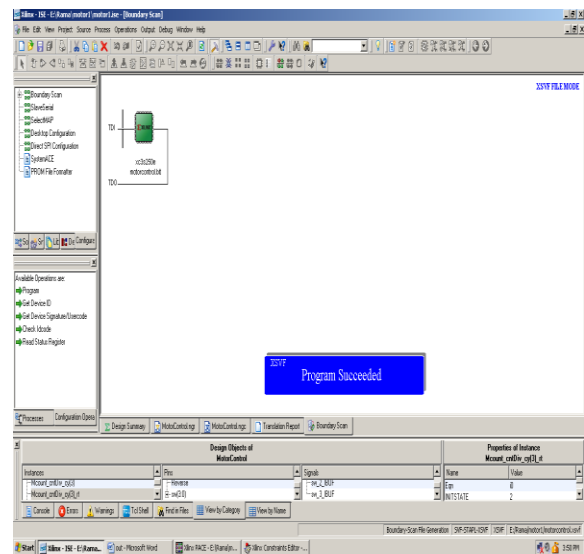


Figure-6 Programmed Succeeded

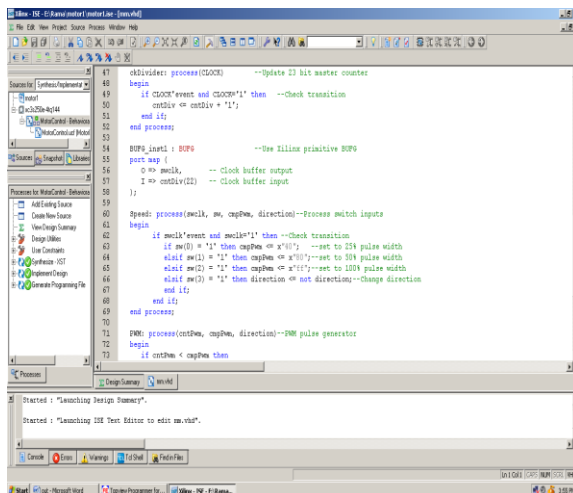


Figure-6(b) Port and Architecture initialization variables VHDL Language

5. CONCLUSION

We provide low-priced, easy-to-use, high-precision motors, with a broad range of applications from AV appliances, OA appliances and other electrical uses. Our unique development and supply system enable you to choose from a wide selection of sizes and outputs that vary from compact, thin types to high torque types, with a combination of characteristics to suit your particular application requirements.

REFERENCE

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